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THE

DENTAL COSMOS:

A

MONTHLY RECORD OF DENTAL SCIENCE.

Devoted to the Interests of the Profession.

EDITED BY

JAMES W. WHITE, M.D., D.D.S.

Observe, Compare, Reflect, Record.

VOL. XX.

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THE

DENTAL COSMOS.

VOL. XX. PHILADELPHIA, JANUARY, 1878. No. 1.

ORIGINAL COMMUNICATIONS.

DENTAL PATHOLOGY AND THERAPEUTICS.

BY J. FOSTER FLAGG, D.D.S.,

FORMERLY PROFESSOR OF DENTAL PATHOLOGY AND THERAPEUTICS IN PHILADELPHIA DENTAL COLLEGE.

[Entered according to Act of Congress, in the year 1873, by J. Foster Flagg, D.D.S., in the office of the Librarian of Congress at Washington.]

(Continued from page 622, vol. xix.)

IF, however, the filled cavity of decay is not so situated as to form a desirable avenue for ingress, a tap-hole should be *commenced*, not with the positive idea of immediate completion, but only with the hope of such a possibility.

As progress is made, if opposing tenderness, practically of dentine, is met, drilling should not be persisted in, but the work of obtunding should be at once commenced.

It must be remembered that the effort is not to obtund sensitive dentine alone, but that the devitalization of the pulp is the main matter in hand; therefore, as soon as sufficient depth of spear-pointed drill-hole is accomplished, this *may* be enlarged, if considered desirable, and *increased soreness of the tooth is not being produced*, and an arsenical application be made from the end of a fine probe.

This should be covered with a tiny pellet of cotton dipped in creasote or oily carbolic acid, placed gently in position, in such manner as not to cause the arsenical paste to exude, and the superfluous creasote or carbolic acid *carefully* removed by bibulous paper or other absorbent. A drop of thick solution of gum sandarac should then be placed upon the outside of the cotton and surrounding enamel, and allowed to harden for a few minutes, when it will become of such consistency as will permit of that additional *hardening from moisture* which will insure that protection against escape of arsenic so much to be desired.

It will usually be found that a few hours (three to five) will suffi ciently obtund to admit of deeper drilling, when this should be done, *carefully*, remembering the *possibility* of excessive pain upon reaching the pulp, due to its hyperæsthetic condition.

This *excessive* sensibility does not *always* exist, but it is a *very usual* concomitant; these cases should, therefore, always be treated as though it existed, until it is happily proven to be not present.

It sometimes occurs that a second, and even a third, application of arsenious acid is needed before a *comfortable* entrance into the pulp-cavity is achieved.

When the entrance is finally made, it is generally followed by what may be termed *profuse* hemorrhage, considering its small source; this is accompanied with *visible throbbing*, synchronous with arterial pulsation, but is so far different from ordinary *alleviating* hemorrhage as that it is almost always accompanied with pain, if none happened to be present at the time of puncture, and augments, notably, any that may have been existent.

The suffering which now supervenes is sometimes exceedingly severe, and, for a time, very difficult to control.

I have repeatedly essayed palliative treatment, both during drilling and after its accomplishment, but I have *never yet once* succeeded in making a tooth *of this kind* comfortable for any great length of time with anything less than complete devitalization of the pulp. It is for this reason that I have ceased to make further effort toward pulp-conservation, *in these cases*, by depletion or other recognized means, as I have invariably found such practice far from advantageous.

My experience has been that it has induced a condition of chronic irritation, during which the tissues outside of, and in proximity to the roots of such teeth, so sympathized as to eventuate in nothing less than extraction of the teeth as the ultimate means for relief.

As I have said, the suffering which almost always follows the opening into the pulp-cavity is exceedingly severe, and, for a time (from fifteen or twenty minutes to one and even two hours, in extreme cases), very difficult to control.

With all our various dental obtunders, such as acetate of morphia, chloroform, oils of cloves, sassafras, cinnamon, mustard, etc., creasote, carbolic acid, phénol sodique, laudanum, acetate of lead, nitrate of potash, etc., we have, in varied cases, varied results; medicaments which act like charms in some instances proving utterly inefficacious in others.

In a majority of cases I have found a mixture of *dental* tincture of aconite (syrupy consistency) and *dental* tincture of iodine (ʒiv to f℥i of alcohol) the most effectual remedy which I could apply. I therefore resort to this first, trying other applications only when this fails.

Hemorrhage in these cases is, of course, not an *outpouring* of blood, but it is sufficient to fill the cavity of decay or tap-entrance, again and again, with very unsatisfactory celerity; the blood should therefore be taken up by means of muslin or bibulous paper, and the application of aconite and iodine be made directly upon the pulp by means of a blunt probe.

If the hemorrhage continues abundant, much of the mixture will be washed out; this should be remembered, and the application renewed from time to time, during the continuance of the toothache and bleeding.

A few drops (five or ten) of the tincture of erigeron or chenopodium album may be administered for their systemic effect, with advantage.

When the hemorrhage finally ceases and the pain is gradually subdued, the cavity of entrance should be *very gently* cleansed by wiping out with muslin or bibulous paper dipped in *warm* water, another application of the mixture of aconite and iodine be made upon the pulp, and the entrance closed sufficiently, but not too tightly, by pellets of cotton dipped in phénol sodique, using *lateral pressure* for their impacting, so as to avoid direct pressure upon the pulp.

If all remains quiet, a few days (five or seven) should be permitted to pass, when as much of the pulp may be removed as can be without pain, when, if necessary, another application should be made.

I have generally found the more cleanly mixture of dental aconite and acetate of morphia paste to meet all indications from the time when the *canals* had been fairly entered, and would therefore advise a trial of this as a deep application.

If, however, it is found not to act so happily as the aconite and iodine, a return to this combination would, of course, be indicated.

I would warn against any *undue haste* in the treatment of these peculiar cases, for of all dental difficulties no other has so appropriately for its motto "make haste slowly."

If *quiet* on the part of the pulp will permit of it, I allow weeks, and sometimes even months, to elapse between dressings, covering these with temporary stoppings of cotton dipped in solution of sandarac, or with gutta-percha, but always removing and re-dressing upon the occurrence of paroxysmal pain, be it never so slight.

As the terminal portions of pulp gradually die, it is needful that the greatest degree of care and judgment be exercised in the conduct of the case, as it is liable to occur that irritation of tissue is *passed* (so to speak) from within the canal to outside the root of the tooth, in a manner analogous to that which was demonstrated by the presence of excessive tenderness upon pressure, while yet the bulbous portion of the pulp, even, was in a condition of exalted sensibility.

When this is the unfortunate result of treatment, it is a very difficult task to subdue the tendency toward inflammation; it is therefore advised that the latest canal application should be only soothing and antiseptic, *unless these are found insufficient to the obtaining of ease.*

In such event I have had my best results from a long-continued application (from half an hour to an hour or more) of a *mild, interrupted,* prime galvano-electric current,—the current of my own dental helix or the A B current of a Kidder's helix,—positive *in* the tooth, the end of the wire electrode in water *in* the cavity (the tooth protected by rubber dam), and negative (sponge) on the nape of the neck or (metal electrode) in the hand.

For tenderness of tooth on pressure, after complete devitalization of "pulsating pulps," I have also found the application of the same form of electricity very efficacious; positive (small sponge) to the gum at sore spot, and negative (sponge) at nape of neck.

Other and more usual methods for combating peridental irritation will be given in place, under their appropriate headings, but I have thought it proper to mention *this one* from the fact of its *peculiar effect* in these cases.

Note.—I desire again to remind those who are not familiar with the application of electricity that it is decidedly a *specialty* in therapeutics, and that its instruments cannot be played upon by a novice, at all as they can be by an expert.

I have never made any claim for *electricity*, as a most valuable adjunct to ordinary dental therapy, which I have not fully demonstrated in any and *almost every* unmanageable case which has presented, either in my own practice or in the practice of others; and I repeat that as the result of many hundreds (nearly two thousand) of electrical applications for extraction of teeth, obtunding of sensibility during the excavation of sensitive dentine, drilling into the alveolus for the relief of alveolar abscess and the *resolution of inflammation*, my success has been *complete* in a majority of cases, and *satisfactory* to myself and patients in ninety-four per cent. of all operations.

If, therefore, others do not *at once* have gratifying results, I ask that they will charge the failure *where it belongs*, and not to the inefficiency of the agent; and request, for the benefit of suffering humanity, that they will *try on* with the *determination* to achieve success, assuring them that the efforts will eventually be abundantly rewarded.

I have stated that the latest canal applications in these "pulsating-pulp" cases should be soothing and antiseptic, and I will add that these are indicated in all cases where pulp-irritation seems tending toward external complications (outside of the root).

Of these applications I rely mostly upon the saturated solution of salicylic acid in oil of cloves (oil of cloves, f℥ss; salicylic acid, gr. x), or a mixture of glycerin and dental aconite (glycerin, three parts; dental aconite, one part), which medicaments should be very *carefully* and *accurately* placed *in the canals* by means of fine probes, *followed* by the gentle introduction of cotton canal-dressings dipped in the medicine.

The need for exceeding care in the use of these medicines is due to the injurious effect of the salicylic acid upon dentine in the solution, and the unpleasant and persistent effect of the aconite upon the gums, tongue, and cheeks, if it is allowed to come in contact with them.

If, in the entire range of operative dentistry, plastic filling materials are ever indicated, they are certainly demanded in the completion of these cases; and, for this reason, I always aim to so locate the tap-hole that a *permanent* stopping of gutta-percha may be introduced.

In concluding my remarks upon this subject, I wish to *impress* the importance of avoiding the *least mechanical irritation* during the progress of the work; thus, if in the introduction of cotton, either medicated or as temporary stoppings, a sensation from pressure (never so slight) is produced, *the removal of the cotton is imperatively demanded*, that the re-establishment of the condition previous to the irritation may be permitted without the existence of even this slight irritant.

It is a nice point to appreciate, that perfect comfort may be established by the effort of nature, while yet a slight irritant may be exerting its power for harm; and yet, *in due time*, that irritant will slowly but surely make its presence known to the delicate guardians of comparative normality.

The more *slowly* this is announced in these critical cases, the more surely is the final result difficult of control; therefore *remove the cause of trouble* (it may be impinging cotton or filling material; it may be impinging fluid medicament; it may be impinging *air*), and try again the various steps which it is desirable should be taken without producing any response of pain, *or even sensation*, from the patient.

Above all must these directions be remembered when the final filling is being introduced. If it is decided to use foil, the impacting should be done with that gentleness and *direction of force* which, while it produces a sufficiently solid plug, does so without unnecessary irritation.

If it is decided to use gutta-percha, the impervious character of the material should be constantly borne in mind, and its introduction should be by small pieces and in such wise as to preclude the possibility of forcing air in advance of them, *removing it at once* if such untoward accident should unfortunately occur.

DISEASES EXTERIOR TO THE ROOTS OF TEETH.

DENTAL EXOSTOSIS.

For more than half a century the various authorities in dental literature have given a portion of their efforts to the discussion of exostosis of the roots of teeth.

Mr. Fox, 1814, states that fangs are occasionally enlarged as in exostosis; that the cause of this disease is obscure; that it sometimes exists when the crowns of the teeth are perfectly sound; that in other cases it appears to be the effect of indolent inflammation, arising from caries in the body of the tooth and extending to the fang.

Mr. Bell, 1829, suggests that it would seem to be the dental periosteum through which is developed this increased deposit of bony substance. He denies its existence in otherwise perfectly healthy teeth, and states that he has proven by personal investigation the presence of "incipient gangrene" in both teeth which were spoken of by Mr. Fox as illustrations of this affection in sound teeth.

Mr. Jobson, 1834, states decisively that exostosis of the teeth consists of a preternatural and diseased increase of the substance of their roots, arising from some peculiar action of the vessels of the dental periosteum. He admits that roots are exostosed while their crowns appear healthy, and suggests local bleeding as a treatment worthy of trial for the relief of this affection before a final resort to extraction.

Mr. Tomes gave us, some thirty years since, the first article on *dental exostosis* which has claim to rank as a scientific contribution. Indeed, so very fully has he written upon this subject that I can only hope to leave with it for myself the impress of *individuality*, while, with pleasure, conceding to him all *originality*.

During the first of our considerations in regard to pathological conditions, reference was made to the effects upon nutrition which resulted from altered circulation.

It was shown that any irritant—mechanical, chemical, or vital—so changed the circulation from normal as to make of it "determination of blood," "congestion," "inflammation," and "suppuration," according to the strength and duration of the irritation.

For our present purpose it is only necessary to recall the fact that such strength of irritation as was only sufficient to induce "determination of blood" to a part resulted in hyper-nutrition of such tissue or organ.

It only remains that we should recall the teachings of tooth-formation which had reference to the building up of the roots of teeth and their subsequent nourishment, and we are possessed of the key to the clearest possible understanding of the subject under discussion.

Without entering into the disputed question as to the whole function of that membrane which lines the alveolus and covers the root of the tooth, it is sufficient for our purpose that it is conceded to be the source whence is derived the nourishment for "formed cementum."

Any irritation, therefore, which would stimulate the functional action of this membrane, and not exceed its nutrient capabilities, must result in excessive formation of cementum.

This is dental exostosis,—this increased growth and cementum are microscopically identical.

Any irritant, then, which is sufficient to excite a *slight* amount of irritation about the root of a tooth, and which is of sufficient *continuance* to permit of a gradual, hard-tissue formation, must be accredited with the resulting exostosis.

The *time* absolutely required for this is *months* at least, and usually extends over a period embracing even a number of years.

I have specimens showing the various progressive stages of this disease, ranging from the thickened peridonteum through "effusion," "coagulation," and "cartilaginous" and "cemental" organization.

The *appearance* of dental exostosis varies, some being chalky, some yellowish-white and of firmer consistency, while it again seems denser and more polished than the original cementum.

(To be continued.)

THE ORAL CAVITY.

BY E. W. FOSTER, M.D., BOSTON, MASS.

(Read before the New York Odontological Society, October 16th, 1877.)

Gentlemen of the Odontological Society:

In obedience to an invitation of your executive committee to prepare a paper to be read before your society, I have now the honor to transmit the same. Previous, however, to the presentation of my general remarks, and as somewhat introductory to them, allow me to call your attention to certain facts which, to my mind, have been too generally ignored or forgotten, not only by the "captains and the shouting," but, as a rule, by the more plodding mannerism of the rank and file of the main army. I allude to the fact, which will appear clear to you on reflection, that there is an *eloquent* side to our profession, and in many respects, I may say, one of *poetical* interest as well. These take in a higher and broader view of professional duty and possibility than the monotonous dial-plates of office hours, which to many, I fear, are nothing but endless treadmills, the daily round of which, year in and year out, is endured simply to maintain a physical existence. In that higher zone, one can get far above and beyond the gnawing sound of the excavator, the purr of the lathe, or the jingle of ducats. It is to a part of this view, at least, that I would call your attention during the passing hour, leaving, meanwhile, the mazy realms of theory and practice to a season of well-merited rest.

It is through the vari-colored windows of fancy and imagination that the true artist looks for trust and encouragement, the mellow light of inspiration shining through and falling like a mantle over him. I would also say of our own profession: if we would seek to know its higher ranges and possibilities, we should couple the instincts of the true artist with the technique of the dentist. Then our art, now so useful, would be crowned by the beautiful, while each would mutually sustain and challenge the other. To this end, brethren, may you ever add to your eminent examples of practice the finer and softer outlines of your highest ideals. Then will your lives, like your profession, be not only robust in warp and woof but rich in texture and pattern, and the whole vitalized by a broad and liberal culture.

I have chosen as a subject for your present hearing, "The Oral Cavity." I trust that in the time allowed for its present consideration I may, at least, be enabled to awaken somewhat anew in you the life-long interest you have felt in its general and special functions. By touching the subject here and there as fancy may direct, but fact supervise, I shall hope to evolve a more agreeable harmony than were, perhaps, possible if I should perform my solo by the monotonous twanging of one string. I shall have, therefore, to speak concerning several offices of this cavity, and their importance; but more especially as regards the teeth, their various functions, and the part they occupy in the unity and affairs of the body, remarking upon the routine of daily life, and the many pleasures of health and society, which depend upon the normal activity and expression of these functions in general, as wrought out through the phenomena of speech, vocalization, and other means of expression. Concerning the concurrent phenomena of primary digestion, which are prehension, mastication, insalivation and deglutition, time will permit at this hour of only incidental reference.

THE ORAL CAVITY.

As a subject, the oral cavity means and contains a great deal that is of the highest interest to us all, both professionally and otherwise. In its charmed circumference is included the whole field of practical and theoretical dentistry. In its hollow and fleshy pouch all the skill and wisdom of our profession is centered and contained. This—"the mouth," the oral cavity of man—is the field of all our professional labors. Simply as a phrase, "the oral cavity" is most significant and expressive, for it is one that can be properly said of no other living thing but man. Man: who is the apex of a composite organic and inorganic pyramid, and who, of all created things, alone is endowed with articulate speech; into whose mouth, the vestibule of his great and vitally essential digestive tract, is daily taken his food and there comminuted, then passed on through other phenomenal stages, till at last it becomes a nutrient force to supply waste and make the old fields new again along all the red arterial rivers of the body. This nourishment, first taken into the mouth, is, besides the supply of physical necessities, in part correlated in the wondrous acts of speech and vocalization. The hearty meals of our "divine" singers, the groaning tables and leviathan appetites of our greatest actors and orators, are no less essential to the proper articulation of the sublimest operatic endeavor, or the delivery of the finest oration, than the vocal organs and adjuncts themselves. Genius, always a good worker in its own line, is or always should be a good eater. In this case, food-force has blossomed into a refined product,—that of song and speech. The teeth are, therefore, highly important as the first instruments to this necessity,—the reduction of food that somehow becomes so miraculously transformed into varied life and labor. That grand master of the "divine art," Handel, was an enormous and vigorous eater, yet he was equally a vigorous worker. The mental labor sufficient to contemplate and execute the compositions of his many immortal monuments of musical eloquence, is calculated to appall the stoutest worker living. Genius has, from the force of such examples, been briefly defined as being an extraordinary capacity for labor, and in this labor, by their relationship, it will be seen that the teeth occupy an important and enviable position in the intimate affairs of life and the progress of the age. Mastication of proper food is the first essential act towards physical existence, and through this physical entity, of course, lies the possibility of man's future mental progress and distinction.

Concerning its range of function, how many of us, as dentists, bending from day to day, and year to year, over the labors of our specialty, think, even to an approximate fullness, of the wonderful use and beauty of the various phenomena of the oral cavity, the great part they bear, and have ever borne, in the profound concerns of intelligence, of society, and of life? Yet it is only in the best health of its activities and the normal physiology of its parts that its completest triumphs are possible. It is, therefore, of sufficient glory to the aims and possibilities of dentistry that this important region is so largely committed to its care and responsibility. May we all the more appreciate the delicacy of this compliment among the professions, and its responsible position, as affecting for weal or woe many of the most important concerns of humanity! In its range of function, and in its necessity to the life and advancement of the human race, the oral cavity is second to no other portion of the miraculous body of man. For, whether its labors lie in the line of the great and vital miracle of digestion, or in the addition of beauty to the human face, in the varied and subtle expressions of the emotions, the smile of pleasure and the lip of scorn, or in the forensic glories of speech, as in the high and sublime periods of the orator, or, again, in the tender and winsome accents of friendship, the sweet and sibilant soundings of love and of maternal caressing,—in all these, and many more, the oral cavity, and its external guardian, the lips, and the dental armature within, the tongue, with its vocal and dental adjuncts, are all rich in the vast and accumulated experience of the human race, and they still point also to an untold product in the harvest of man's progressive future.

The mouth, or, better for our present purpose, the oral cavity, locally and anatomically considered, may be said to commence from its external view, at the central opening of the great sphincter of the lower third of the face, the *orbicularis oris*, that great muscle of expression in whose activities so many emotions of the mind find outward revelation. This sphincter muscle is at one and the same time a gate and guard to the entrance of the oral cavity and digestive tract. In the fœtus, we find the mouth corresponding to the absence of union between the first and second visceral arches, as to its facial aspect, and inclosed on its sides by the buccinator muscles, above by the palatine and maxillary arches, and below by the mandibular arch. On the floor of this cavity thus formed the tongue intrudes from behind, which organ, as it lies at rest on the floor of the mouth, is surrounded later in the child's life by the upper and lower arches of the teeth, which articulate somewhat perfectly in a vertical position by the ends of their free extremities. The cavity thus formed, and situated between the cheeks and jaws, may be closed in front by the lips, while behind are situated the velum palati and the orifice of the pharynx. Mucous membrane lines the entire cavity, even to the necks of the teeth. The oral cavity contains the teeth in double and reciprocal arches, the gums and the alveolar ridges underneath, the tongue, the excretory ducts of the salivary glands, and the mouths also of numerous mucous follicles. It has the senses of taste and touch, and it serves in respiration, but secondary to the nostrils. It serves also in the articulation of human speech, in vocalization, mastication, insalivation, and deglutition; aided by the cheeks and lips, serves in expectoration, suction, blowing, whistling, kissing, and cooing. This brief outline of the territory of the oral cavity, with a mere mention of its contents and functions, will suffice us for the present. Your sufficient knowledge of its parts and their location makes it unnecessary to allude to the matter further in its anatomical sense.

We find in and about the oral cavity the termini of many twigs and branches of the remarkable trigeminus, or fifth nerve, which is the genius of our operative department. It brings the teeth into being, develops them, and gives them sensation. It clashes them together in mastication by the twigs of its motor branches. It superintends the order of the teeth in all of their various stages of growth from papilla to crypt,—from the formative groove in the primitive mucous membrane to the eruption and final perfection of the entire tooth. This great cranial nerve is the most exquisitely sensitive nerve in the body. Its division and territory of action are equally important and striking, and they both involve, or are exclusively concerned, in most of the organs within the oral cavity. This nerve, from its terminal chances of injury as regards caries and accidents of the teeth, compels the dentist to witness daily many forms of nervous aberration, some, indeed, very severe and even dangerous. These pathological conditions take mostly two directions from the normal health-status of the nerve itself,—either *downward* through the grade to atrophy, paralysis, and gangrene; or *upward* in the scale to the most exalted pain and sensibility. Not alone the teeth by their diseases are thus affected, but also, through the medium of the great sympathetic system, the functions of the special senses become frequently involved to a serious extent, and some of the most important portions of the organism besides these are also impaired. If paralysis casts its pale shadow over the nervous tract, the organ to which these lines of intelligence, sensation, nutrition, and motion went is lost to use, and, like the picture of some great and once-proud vessel, that braved many storms and sailed to many countries, and brought many pleasures to man, now cut off from crew or captain, lies rotting at its wharf.

Concerning the sensibility or nerve endowment of the teeth, we observe the most remarkable gradations of sensation in them of any portion of the body. Vitalized as they are by the great hyper-sensitive nerve, the fifth, the teeth, by their peculiar structure and density, are at once both competent for the highest sensibility, as in certain aggravated forms of sensitive dentine, as well as a comparative negative state of sensation, such as health confers in the circumstances of ordinary use, as in eating. Further, how beautiful is the process by which nature protects the delicate structure of the dental tissues within, by the wonderful qualities of the enamel which is without,—that curious inorganic grist, which was ground out by organic mills,—dense, clear, beautiful, and non-conducting! The enamel is a crowning glory to the tooth, for this protects, in the most efficient manner, the interior structure from the dangerous effects of thermal shocks, from wear, and other injuries; yet it permits a quick warning against sudden and approaching danger, by means of its certain and almost unaccountable method of sensation through its body. Thus it completes one of the most marvelous and beautiful arrangements in the whole economy. Here it is that we see a union of mind and matter, as it were, in this humble but beautiful tooth,—the border-land where organic and inorganic substances unite in the production of an organ whose offices are as unique as they are varied. For example, externally we find a dense, crystalline substance, increasing by higher and higher organization, till we reach the inner and highly-sensitive nerve of the tooth, which is the vehicle for impressions to the brain, or from matter to mind. Thus we find that these remarkable dental organs, the teeth, are capable of transmitting many sensations to the brain, as well as being susceptible to thermal, chemical, electrical, and other conditions, thereby becoming, both in health and disease, important parts in the sublime unity of the human body; and so affecting, more or less profoundly, as the case may be, the welfare of the whole.

Among the various properties, the teeth have a fine tactile sense, which, in the case of the blind, is exalted very frequently to an astonishing extent; since by the exigencies of their condition they are naturally compelled to depend more than ever upon the testimony of their remaining special senses. Their ears also become possessed of more sensitive and discriminating power, and the tongue more keenly alive to the sense of taste: so also with the sense of smell, which becomes more acute and subtle. The ever-active mind, shut out from the source from which it has hitherto been accustomed to rely for most of its information concerning the external world, now requires heavy drafts from the remaining avenues to supplement the loss. The wonderful sense of touch, which becomes almost sight to the blind,—and is to them almost as if we should say there were eyes in the ends of their fingers,—is an inherent endowment of the teeth; and this natural quality, in addition to the sense of taste in the oral cavity, the sensitiveness of the tongue, lips, and, in a certain measure, the mucous lining of the cavity, are all necessary as sentinels of sensibility; first to guard the mouth, and secondly the stomach. Without these faithful guardians the body would have no power to defend itself against daily and hourly attacks of danger from without, lurking in the food of man. In fact, it is the final verdict of these traits, after many centuries in the experience of man, that he is enabled to know what is proper as food and what is not. Apropos of this sense of touch, it illustrates how much we all owe to it as dentists in our operations upon the teeth themselves, since the skill acquired in the commonest manipulations owes everything to this sense. So also in the higher and more delicate triumphs of our profession, success relatively depends upon the finest and most delicate touch, as well as it does upon a clear and well-trained sight. It is, therefore, that the artist or dentist, by reason of such experience and training, has acquired the power which we call "skill," which is another name for the higher cultivation of hand and brain. It is this which enables one to *see* and to *feel below* the superficial area of things, and thereby illustrate in his productions the pith of that high motto, *ars celare artem*, or "art to conceal art." The trained eyes of the dentist, then, can see farther into a tooth than the same eyes could in their novitiate. His hand, also, has attained by practice and concentration of mind that difficult combination of delicacy and strength which peculiarly characterizes the necessities of operative dentistry, and which all first-class operators must have, or fall short of success. The sense of touch, at least in our own profession, is the true handmaid of sight, as we have likewise shown it to be in the case of the blind.

Still further, no doubt, you have often observed cripples and armless soldiers rely upon their teeth, in certain acts of prehension, quite successfully. In this use of the teeth I have seen those who were astonishingly proficient, and went far towards approaching the dexterity of some animals even, whose only real means of prehension were by the use of the lips and teeth. Indeed, in the common order of creation, this method became general.

The teeth have also the faculty, in common with hollow bodies, of receiving and transmitting the vibrations of sound. The deaf can hear by means of their teeth being connected by a rod of glass or wood to a musical instrument, the piano for instance. I have known a deaf mute to go into raptures over music, by means of a pine stick placed between his teeth, and communicating with the wires of a piano. As the piano was played upon, the poor deaf mute's face at once lit up with a bright and peculiar glow of rapture at the great discovery of strange and beautiful sounds, possibly heard for the first time in his life.

A correspondent of the *New York Post*, in 1875, also related that a few years before he was present when a party of school-children were picnicking, among whom was a deaf and dumb girl. The girls, among other refreshments, had each a sherry cobbler given to them, each tumbler having in it a small glass tube with which to suck up the liquid. While each "cobbler" was being gleefully stowed away, all at once the deaf and dumb girl sprang into the middle of the party, with vehement gesticulations, at the same time laughing strangely and pointing to her ears. The other girls gathered quickly around her with eager inquiries, and, as soon as she could recover sufficient self-control to relate the cause of her joy and excitement, she told them by signs, that when she had drank nearly all the liquid in her tumbler, so that the air entered the lower end of the tube, she distinctly heard the gurgling sounds occasioned; *they being the first sounds, till then, she had ever heard in her life.* Again, certain harsh and scratching sounds heard by the natural ear will, in a reverse manner, reflect the most disagreeable sensations in the teeth. This rapid interchange of sensations between the different organs of special sense is also shown after long fasting. In states of great hunger, the sight of food, or, more strange, the mere mention of a savory dish, will, as in many cases confirmed by travelers and others, cause the eye and the mouth suddenly to moisten, and a peculiar sensation of pleasure to endow the teeth, while the lower jaw will involuntarily simulate the motions of mastication, from the sympathetic action of the masseters, pterygoids, and temporals; the whole face is lighted up, and the lips and tongue alike move, as if in anticipation of actual employment.

In the wonderful and important realm of song and speech, the positive relations of the teeth and their adjuncts become essential to the proper formation of sounds and words. They act, however, as passive elements in this matter, by furnishing certain limitations of space in the oral cavity, which are made variable at will. Thus the teeth, in conjunction with the boundaries of the maxillary arches, the mobile lips, cheeks, tongue, and vocal cords, assist in the final finishing and perfection of the sound or word in every vocal or oral effort. Of course, in these phenomenal acts of song and speech, the muscles concerned in the acts of mastication and deglutition must not interfere, but favor as much as possible by passive or active help. With all these adjuncts in perfection, speech is resonant, clear, sibilant, and easy. Yet, if we only remove the passive factor of the teeth from this sum, we get at once an active disturbance in the result. This is more especially noticeable in the loss of the front teeth, decreasing in a certain ratio as we approach the molars. Nature, ever flexible and ever prone to apologize for our defects, either natural or accidental, will, in a great measure, remedy also this error in speech caused by the loss of teeth. This she does by allowing the soft contiguous parts to fall into the spaces once occupied by the teeth. The tongue and cheeks meeting, or clasping hands as it were, across the chasm, harmony as far as possible is restored, but never fully, however, from the very nature of the office once performed by the teeth. An artificial substitute for the natural teeth is therefore no light matter of judgment, especially when we consider a double denture. Success, of course, is relatively more certain according to the skill of the dentist, but there are sometimes certain obstacles that baffle and perplex the best. Here, in this mechanical and prosthetic department of our art, let me add, is needed more of those skillful and especial men "to the manner born." The triumphs in this field will be quite as essential and remunerative as in the department of "Operative Dentistry," so called, for the wants in both are equally imperative, and should be met with equal skill and conscience.

Modifications of the larnyx or laryngeal vibrations were once considered to be the cause or source of all articulation, but learned and patient investigators of the subject have found the contrary of this to be true, inasmuch as all the vowels and consonants may be rendered in a whisper, without any vibration of the vocal cords, and these short and whispered utterances may also be shortened or prolonged at pleasure. The female mind, so fertile in resources, is an adept at both varieties. For instance, having bankrupted the resources of ordinary vocalized speech, she is only too happy if she but has the final opportunity of illustrating to some intimate friend the profound and mysterious depths of whispered speech. In both we owe them much, for I fear language would not be fully utilized after all, or at least developed to its full capacity, without them. From all this we may remark, that articulation largely depends upon the arrangement of the teeth, as well without as with the superaddition of the voice-sounds. But, on the other hand, vocalization without articulation, or, I might say, "songs without words," can be delivered through the nasal passages while the lips are closed, as, for instance, the act of humming over a song or melody to one's self. In this process of smothered singing we for the first and only time find the teeth, jaws, lips, cheeks, and tongue no longer required even in vocalization; but they take away articulation proper, and the perfection, finish, and vibration of vocalized speech, which, we must admit, are the most characteristic features of voice and speech. A parrot, formerly at my own home, would imitate quite cleverly parts of musical scales, and follow with scraps of melody while others were singing. But its tone was what vocal teachers call "head tone," and could not be greatly distinguished from ordinary humming or droning. M. Wartel, the eminent French vocal teacher, the instructor of Nilsson and other distinguished singers, teaches this head tone very largely in his preliminary vocal exercises. He will require his pupils for some days together to sing with closed lips, not only in the practice of scales, but in whole arias from operas. By this means, together with "posing the voice" (so called), he is enabled, it is said, to add many more notes to the registers of those who are deficient in this regard. First, this object gained *without* it, he is then very particular *concerning* articulation, and examines the mouth critically; and those without good teeth and a normal condition of the oral cavity find no encouragement from him, unless the defects are remedied by the dentist. Here we find the example of one of the most distinguished vocal teachers in the world insisting upon the importance of good teeth to his pupils, which indeed, to them cannot be overestimated. All singers should have good teeth, since high success in this art depends so largely upon them; and, so far as my acquaintance with numerous well-known singers would testify, they indeed do have good teeth, at least in a practical sense. Concerning the great importance of teeth in speech and vocalization, I have in mind the incident of an opera singer—a leading tenor—who once called on me a few hours before an evening performance, now some years ago, he having met the dire misfortune of breaking out a front tooth. His consternation was deep and real, since he declared that unless the tooth was at once replaced he would be obliged to plead sickness to the public (a thing often done, he said, from similar causes), and keep in his room that evening; for he declared that without this one tooth he could not pronounce a word or hardly sing a note, and indeed his defect in the most ordinary speech was very marked. To finish the story, I may say that a new tooth was reset for him in time for the opera, and he was happy and grateful.

Further, the oral cavity and its well-being bear important relations to the vital act of respiration. We have shown that it is more or less under the necessity of admitting air into the lungs, while some, indeed, go so far as to habitually breathe this way, but greatly to their detriment, however. Not only are carious teeth detrimental to the purity of food masticated by them, but the air, which more or less passes over these carious teeth into the lungs, is vitiated by such contact. It is true, therefore, that, more or less, these conditions affect the subtle chemistry of the blood, and so, of course, act to the detriment of nutrition and secretion alike.

The care of this important vital cavity is in the hands of the dentist. To him the orator and the preacher come; the vocalist and the practical man of business; those suffering from accidents,—gunshot and others; from the tortures of toothache; from chronic and acute neuralgia; the loss of teeth and their irregularity; the making and proper adjustment of artificial substitutes; the filling, repairing, extraction, and cleaning of the teeth; and, lastly, the general treatment of all the abnormal conditions to which they are so frequently subject.

Finally, as regards the oral cavity both in health and disease, it is not only of professional moment to the specialist, but presents a varied interest to all by the many important offices it performs in human life, by the sensations of pleasure it is capable of producing and receiving in health, as well as the too often painful, and even disastrous results, that follow in the wake of its disordered sensibility. From the birth-cry of the infant to the expiring sigh of senile age it has important and almost constant employment. Its various organs and their daily use are equally identified in the well-being of human life and in the sum of its miseries. It is the commencement of man's highly important digestive tract, the very ante-chamber of his vegetative life.

In this office it is anticipatory to the stomach, which it indeed resembles, in the triturating action of the organs of mastication, its moist and muscular walls, and the profuse secretions of its numerous glands and ducts, acting vitally and chemically upon the nutritive food bolus. The teeth, also, are not only to be distinguished for their great use, but for their beauty as well, which has been recognized through all time. Poets through all ages have descended from their traditional garrets to sing the praises of beautiful teeth. All literatures have bestowed some of their finest similes and expressions upon them. The fair teeth of Persian beauties are mentioned as the "Pearls of the Orient." The poets and sculptors of Greece have poured out rhapsodies upon them. The Bible, the Koran, and other ancient books, swell the voice of admiration and delight. Our modern poets, though having perhaps rarer opportunities of sight, have added their appreciation of the noticeable part which the teeth perform in the beauty and expression of that most wonderful kaleidoscope, the human face. The babe is beholden to its lips for life at its mother's breast. The adult, as well, owes his continued existence to the offices of the oral cavity in its vegetative sphere, which are taste, selection, mastication, insalivation, and finally the deglutition of food.

We have spoken in part of the offices which the teeth hold in expression, vocalization, and in man's distinctive and characteristic feature of articulate speech. It alike gives voice to the seraphic flights of Sontags and Parepas, as well as to the cordial or impassioned accents of Friendship and Love. From its fleshy vault resounds the eloquence of a Demosthenes, a Webster, and a Chatham. Up from its depths are hurled the maledictions of King Lear, or the sombre monotones of the lamentations of Jeremiah. The pathognomonic signs which are ever shifting around the portals of the outer mouth are indices also of the inner character, or of the several emotions of the mind. In their firm-closed lips was revealed, in advance, the iron will of our Grants and of our Wellingtons; later, also, when human lips are still firmer, paler, and colder, they show either the white mark of syncope, or more often, alas! that life itself has passed out over this threshold, leaving only its footprints, white and cold, behind. The smile of beauty and of pleasure; the quivering lip of grief, the pale one of fear; the white lips of anger or of resolution, of daring or of courage; the upward curve of mirth, and the downward dip of sadness and of melancholy; all these emotions and their outward expressions come to the lips for the display of their several characteristics. It is by permission of the various offices of the oral cavity that we are enabled to speak one with another, giving up our inner facts and experiences and cementing all with the articulate assurances of mutual interest and friendship.

Before closing his own lips upon this subject for the present, allow the author to thank you, one and all, for the courtesy and attention extended. Hoping that, while you are to be ever careful and helpful of the great interests of health, comfort, and happiness in other mouths, your own may be no stranger to these desirable physiological states, but may also be set with the seal of contentment, articulate the voice of truth, proclaim the rights of justice and humanity, or swell the songs of praise and peace; and finally, enjoying the daily and vital exercise of these functions in nourishing the body, to the support of heart, hand, and brain, may all harmonize together grandly, and conduce to give you long, useful, profitable, and happy lives.

REGULATION OF TEETH MADE EASY.

II.

ROTATION CONCLUDED. POSITIVE AND PROBABLE SYSTEMS.

BY J. N. FARRAR, M.D., BROOKLYN, N. Y.

THE October number of the DENTAL COSMOS contained the first of a series of illustrated papers on the regulation of the teeth, beginning on the subject of rotation, which will be concluded in the present number. It is to be hoped that it will not be supposed that any remarks in reference to mechanical devices are made for the purpose of special claims to them (although some points possibly may be important improvements), for such claims would be presumptuous; for we often find to our surprise that what sometimes appears new was known to others before. No one is more forcibly reminded of this fact than one who has had considerable experience with applications for letters patent.

My object is to show the advantages of a system founded upon principles, and at the same time illustrate the typical forms of apparatus necessary to show that this hitherto most difficult branch of our business may be made not only easier, but more scientific, by what may be called a positive system of mechanism, conducted in harmony with physiological laws. This system may be successfully practiced by any patient dentist of ordinary ability, who clearly understands the laws of mechanics involved, and the laws governing physiological and pathological changes of animal tissues while under pressure, in order that the line between the two conditions may not be overstepped. The pressure upon the tissues should be intermittent, and only carried so far in degree as to be within the area of physiological or healthy action, and not beyond and into that condition called pathological; by the careful avoidance of which any movement of the teeth may be made without producing inflammation, and with little or no pain.*

For the benefit of those who are not familiar with this subject, the facts in the matter, so far as regards rate of motion, arrived at by a long series of careful experiments by myself, may be summed up in a nutshell as follows:

In regulating teeth, the dividing line between the production of physiological and pathological changes in the tissues of the jaw is found to lie within a movement of the teeth acted upon—allowing a variation which will cover all cases—not exceeding $\frac{1}{240}$ *or* $\frac{1}{160}$ *of an inch every twelve hours, and should be intermittent and not a continuous motion.*†

In mechanics the motions or movements of the screw or the cogged wheel are typical of the positive, and those of the drum and belt of the probable system. The motions and movements of the screw or the cogged wheel are as certain and calculable as the law of gravitation, while the motion transmitted by the belt, though probable, is not absolutely calculable and certain, because the belt *may slip.*

All machines like steam-engines, the value and success of which depend upon exactness in all the details for co-ordination of motion, are built upon the positive system, while such implements as spinning-machines, if not always, are generally built upon the probable plan, by the use of belts and springs. All regulating apparatus constructed purely upon the screw principle belong to the positive system, and are capable of an intermittent motion of any degree, at will, while all devices constructed, and which act purely upon, the principle of elastics and springs, and which are not capable of intermittent force at will, but are continuous in their action, belong to the probable system, and not being always harmonizable with physiological law, are very liable to cause inflammation and pain.

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* This is not intended to apply to those sensitive and sometimes painful periods of time when necessity requires an alteration of the old, or a shift of one piece of apparatus for another.

† Readers who are not familiar with these experiments will find a full explanation in a paper entitled "An Inquiry into Physiological and Pathological Changes in Animal Tissues in Regulating Teeth," published in the Dental Cosmos, January, 1876. A knowledge of these experiments is necessary to the full comprehension of this series of papers.

The want of system in the process of regulating teeth has brought into existence an endless variety of apparatus, some of which have proved practical, but more have not.

Some of these are constructed upon the positive plan, but most are upon the probable basis, and a few are of a mixed nature. Some have been successful because constructed and managed by genius. Some have failed because stupidity or laziness has prevented the production of proper mechanism; others have failed, not so much because of any lack of workmanship and care, but from having been constructed and operated upon incorrect principles.

The different cases of irregularity of the teeth are so various, and each apparently needing a more or less differently constructed appliance, that the notion has been formed that it is impossible to lay down any fixed system of principles, the knowledge of which would facilitate the dentist in his efforts in this branch.

At first it appeared so to the writer, but upon reflection and consideration he was surprised to find how simple and few are the mechanisms necessary to accomplish, by the positive plan, nearly all the desired objects, whether rotation, drawing, pushing, elevating, or depressing the teeth in any direction, or holding them in any desired place after being regulated.

Believing the positive system to be more practical, and the only one which will enable the dentist to conduct the operations upon correct principles with accuracy, and believing that this plan may by illustration be made so simple that any dentist of ordinary ability can understand it and be enabled also to manufacture all the necessary appliances, my efforts will be mainly confined to this method.

Although the simplification of regulation has been a great desideratum for many years, it has for some time been evident to me (though by most people thought to be impracticable) that the time will come when the regulating process and the necessary apparatus will be so systematized and simplified that the latter will actually be kept in stock, in parts and wholes, at dental depots, in readiness for the profession at large, so that it may be ordered by catalogued numbers to suit the needs of any case. So that by a few moments' work at the blow-pipe in the laboratory the dentist may be able, by uniting the parts, to produce any apparatus, of any size desired, at minimum cost of time and money.

It is not claimed that the pursuance of any *one* system *under all circumstances* is a guarantee against difficulties, as these are liable under any system, and it may be necessary to resort to other methods to gain some points.

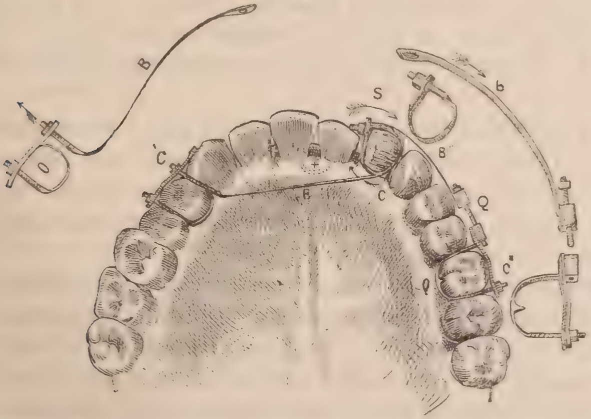
Experience has taught me that whenever results have not been as anticipated by the positive system, it has not been so much the fault of the system as a misjudgment of the extent of force and resistance between the apparatus and the living tissues. Especially may this be so when the combination of partially antagonistic forces gives them a carom-like direction.

The last paper explained two varieties of instruments for rotating teeth in their sockets,—the "box-wrench" (No. 1) and the clamp (No. 3),—both of which are so constructed as to be capable of being firmly secured to the tooth, so as to allow a powerful leverage that will tend to rotate it by suitable side-draughts. But while a single lever wrench will often do excellent work, and meet all the desired wants, it will be seen upon reflection that any single or one-sided draught upon a single lever necessarily gives a side as well as a rotary force to the thing to be moved.

This is especially noticeable in the process of rotation of teeth, where the socket will in time yield to the pressure, and the side movement of the migrating tooth will be found to tend in the direction of the impingement, corresponding to the degree of absorption produced in the alveolus. Consequently, to prevent or arrest any such tendency a counter-force should be applied, so that it may offset the one-sided force, and at the same time not interfere with the rotation of the tooth.

An inventive mind will suggest various ways and means to accomplish this point, but the accompanying illustrated device (Fig. 5) will be sufficient to meet the difficulty in most cases.

Fig. 5.



The clamp or box-wrench (Figs. 3 and 4 in the October number, Dental Cosmos), having been firmly secured to the tooth, according to explanations in that number, and the side-draught apparatus applied, a counter-action is produced by securing a clamp, C'', around some distant tooth, *O*, for anchorage; and having connected the two devices by means of a thin metallic (gold or platinum) band, B'', with one end first secured to the anchor-clamp around the distant tooth by means of a bolt, *Q*, through a smooth nut soldered to it, and the other punched end caught over a pin, *S*, soldered on the band of the clamp *C*, a corresponding off-set force can be made by tightening the screw *Q*, which will cause the band to draw upon the box-wrench or band *C*, as illustrated in the diagram, which at the same time assists in the rotary motion of the tooth, care being taken always not to tighten this (as likewise with all regulating apparatus on the screw principle) more than will be comfortable to the patient. Just enough to feel comfortably snug will, I have found, be about the right degree of pressure to be in accordance with the above law.

Fig. 6.

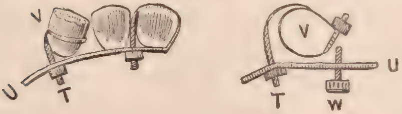


Fig. 6 represents a simple little rotating apparatus that sometimes may be made of great service. The nut *T*, when tightened, draws the bolt through the bar *U*, and being attached to the band-clamp *V* on the opposite side of the tooth causes the tooth to rotate, and at the same time drag backwards if desired. Should, however, this latter movement be undesirable, it may be prevented by a little screw, *W*, passing through a threaded hole in the bar *U*, which, impinging against some point (or nut), as shown, holds the tooth in position. Should it be necessary, this screw may be made an assistant rotater; but a proper shaping of the bar by bending or filing will generally be sufficient for this purpose.

When practicable, this is one of the best pieces of regulating apparatus for rotating teeth that I have ever used; not only because of its cheapness and simplicity, but also because of the ease of management and comfort to the patient thus rendering it oftentimes superior to the other devices mentioned.

Two of the greatest advantages recommending the positive system are firmness of the apparatus in the mouth, and the fact that, with a little instruction the patient is enabled, by the use of a properly made key for turning the nuts (*night and morning*), to do a large part of the regulating work at home; thus rendering it unnecessary to go to the dentist oftener than once or twice per week, and sometimes not oftener than once in a week or two.

"THE USE OF GOLD vs. PLASTIC MATERIALS."

BY MARSHALL H. WEBB, LANCASTER, PA.

(Read before the Odontographic Society of Pennsylvania, November 7th, 1877.)

Dr. J. Foster Flagg states that "It is more than twenty years since Dr. Clowes, of New York, took the ground that 'plastic fillings' would save teeth better than 'gold,' and he then offered to prove it, if desired, by taking charge of a half mouth with 'plastic' in opposition to 'gold,' and leaving time to show the result." Had a thoroughly capable operator taken "the ground" referred to, a case would doubtless have been taken "charge of," and the "result" been known. Dr. Clowes would very probably have had his ground contested, and his position proven false (in principle, but perhaps not so far as his capabilities are concerned), had Dr. Atkinson, Dr. Varney, or any first-class operator considered him "worthy of his steel."

Dr. Flagg entertains views similar to those held by Dr. Clowes, and in a lecture delivered February, 1877, he repeated a "challenge" substantially as follows: "I challenge any operator to take one side of the mouth of any patient having teeth *less* than medium quality, and fill them with gold in the best manner he can, and I will take the other side and fill with amalgam, or other plastic material, and make my work last longer, with less than half the pain and half the expense, and also make such work more satisfactory to the patient."

In reply to notes sent Dr. Flagg in reference to such "challenge," he states, "I only mentioned the form of challenge at that time to illustrate how firm we were in our convictions and of what *had been* our desire as a means of convincing others. I then said that my convictions were firmer than ever that I could sustain the conditions of the challenge, for they were based upon a much larger and constantly growing experience." . . . "I did not repeat the 'challenge' at my lecture as, at that time, anything new, but only as a reminiscence, and without any idea that, at this late day, it would kindle any spark;" yet he also stated that "if you *really desire* to test the results which follow the use of gold *vs.* plastic materials, I shall be more pleased to take a mouth with you than with any one else with whom I am acquainted." I answered that I "*really desire*" so to do, —to demonstrate that Dr. Flagg is (and others are) wrong in attributing the cause of failure in dental operations to the gold rather than to the incapability or failure on the part of the operator to insert the material well and in such a manner as to thoroughly exclude fluids, for without moisture around fillings no chemical action can take place and currents be started.

Dr. S. B. Palmer states, for instance, that "So long as a filling of gold and tin remains moisture-tight there is no action, no current beneath the plug, which is the case with any material. . . . When the plug fails to exclude fluids, . . . the tin becomes oxidized to a greater degree, by reason of its connection with a negative element, the gold. As the oxide of tin is the antiseptic sought to arrest decay, this is furnished in greater abundance by combination. As the tin becomes incrusted by the oxide thus formed, like any battery with its plates oxidized, the current ceases, and thus the tin is saved from further loss. The same principle underlies all alloys."

Tin foil is certainly the next best known in value to gold as a "filling material," and (for a reason similar to that given by Dr. Palmer) it is even better than gold in the hands of those operators who are incapable of so inserting gold as to make the filling moisture-tight at every point.

Dr. H. S. Chase writes that "Where plugs leak so as to allow the mixed saliva to permeate between the walls of the cavity and the plug itself we have in each such tooth a battery, and there are as many batteries of a single cup each in the mouth as there are such leaky plugs." If in each case (where a "*plug*" is simply inserted) a first-class operation was performed, and "mixed saliva" not *allowed* "to permeate between the walls of the cavity" and the gold, we would not have a battery of even a "single cup in the mouth."

Although Dr. S. B. Palmer says that "where there is no moisture there is no action," yet he states that "we cannot rely upon the mechanical perfection of a filling." Oxidation does not take place where fluids do not enter, and where moisture *is* there may not only be such oxidation, but more decided chemical action, resulting in disintegration and destruction of tissue; therefore, can the oxide of tin—"the antiseptic sought to arrest decay" (and such "preservation" of dental tissue has been said to be "*chemical*")—be relied upon?

Dr. Flagg has, as he has several times stated, "put into bottles the beautiful, first-class gold fillings of celebrated fillers, which have lamentably failed, many of them in less than a year." He labeled each bottle with the initials of the operator who (if the patient was not in error) had inserted the filling or fillings to which he refers. "I have done this (he says) with a view of ascertaining where gold will fail in spite of the best skill." I saw the contents of such bottles, and noticed that not one of the cavities into which a filling had been placed could have been prepared in such a manner as to have retained it long and excluded fluids; the fillings had not been well anchored, and some of them could have been loosened while being smoothly finished. Very many of the "fillings" are almost shapeless masses of gold, and they do not indicate that any "skill" whatever had been bestowed upon them. It is not evident that a really first-class operation had been performed in any one of these cases, and even if this was clearly proven the cause of failure cannot be attributed to the gold, if it could then be to any of its forms of preparation. Patients often forget the specific work accomplished, but, even presuming that Dr. Flagg's "bottled gold fillings" were really the work of the operators designated, fillings are sometimes dislodged by some unusual force, unwittingly applied by the patient.*

We cannot be certain that one is a first-class operator unless we have seen a number of his operations, and even then the real value of the estimate which is made of such operations depends very much upon the correctness and efficiency of the judgment of him who makes the examination. That we may the better get at the truth it is necessary to know whether those who propound or accept theories are truly first-class operators and conscientious practitioners, for surely no one's theories should be accepted or his teachings followed unless he who announces them has demonstrated, beyond a doubt, that he is really capable of properly doing that which he professes to do. If, for instance, a practitioner be fully capable of performing really first-class operations, then his "tests"—"tests" such as those made by Thomas Fletcher, of England—in reference to "leakage" around fillings, and his opinions of the same, might be entitled to earnest consideration; but even if one be thus capable, gold cannot be inserted in a glass tube without a movement of a portion or the whole of the mass of such gold, because of there being no suitable foundation to build upon. Something might be placed in one end of a tube, however, and be so arranged that a starting point may be had. When cohesive gold is used for any such purpose, and particularly when first-class operations are being performed, the foil should be folded (unless heavy gold be used), and then cut into small pieces.

All foil ought to be impacted by the aid of the mallet, and "by that *impact* driven true to its aim." When properly prepared and manipulated in such a manner, cohesive gold foil can and should be used in the performance of all operations, and especially when frail edges of enamel are to be incased and protected, and the whole of the tissue which has been destroyed properly restored with gold, and this finely formed and finished, so that it shall be in conformity with the design given us by nature.

While it is far better to insert amalgam, or other "plastic material," than to attempt to save the natural teeth by very imperfectly manipulating gold, or to extract the valuable organs intrusted to our care, yet each and every practitioner ought to properly and fully qualify himself to perform all the operations he may be called upon to perform faithfully, conscientiously, and as perfectly as possible under all circumstances, and regardless of the fee which he may expect to receive and to which he will then, and not until then, justly be entitled. Dr. Atkinson (whose work through life qualifies the remark he made) once said, "Give me honesty and I'll prophesy capacity."

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* Since the reading of this paper before the Odontographic Society of Pennsylvania, and during his discourse before the late special meeting of the New York Odontological Society, Dr. Flagg stated that he has now put all the "fillings" referred to into *one* bottle.

The term *fine* may be applied to an operation which is not, strictly speaking, a fine, full, and perfect restoration of the contour of missing tissue,—may refer to those, of whatever type, which bear some mark of genius, and which come somewhere near perfection to that extent or outline to which they are carried. I now refer particularly to those operations where the gold has been so firmly anchored as that not a particle of it moved while it was being impacted, and where it has been well built against the dentine and carried fully out to, and finely finished with, the margins of enamel, and all this, too, in such a manner as to entirely prevent fluids from entering between the metal and the tissue against which it has been placed. When such operations (which bear many of the characteristics of those I would call first-class) have been performed, the gold tint should be seen through the light walls or edges of translucent enamel, immediately upon or soon after the removal of the rubber dam and the completion of the operation. If an opaque or dark line or spot be visible at or near the parts where gold ought to be in contact with dentine or enamel, then the operation has been quite imperfectly performed, and chemical action may soon follow and the entire filling prove a failure. I have had such failures (more of them previous to about four years ago), but those which I do occasionally have are due almost, if not entirely, to some marked imperfection in the filling which had occurred and been unnoticed at the time the operation was performed (and the operation had to be re-performed); nevertheless, I have for several years past been able to so treat (and now, more than ever, so operate upon) the teeth of my patients as to save *all* the organs operated upon, and that, too, by the use of gold alone.

So far as gold as a "filling material" is concerned, I would here state that the ability required for, and the principles which underlie its successful manipulation, have been shown and been established by Dr. R. W. Varney and others, to say nothing of those first-class, faithful, and conscientious practitioners who are still living, and who yet perform fine operations and save teeth with the material referred to, each one of whom could show a number of "unbroken arches" of priceless organs as the result of the use of gold. There are those who have done this for thirty years and more. So far as the material has to do with the success of operations, therefore, I would ask, What more could be expected of gold?

Disintegration may again take place upon the *surface* of enamel near the point where this tissue comes in contact with, or in close proximity to, that of the adjoining teeth; but that such contact and disintegration of tissue be prevented, and to restore the organs to their original form and usefulness, I build out and finish the gold to the line which defined the contour of the lost tissue. I do this in such a manner that the enamel-tissue of one organ may be free from contact with that of the next in the arch, and so that a part of the gold in the one may approximate and be sure to rest firmly against the normal tissue of, or a filling (if one has been inserted) in, the adjoining tooth; when caries will not be likely to recur (and never at the point of contact), because of the freedom from proximity and the cleansing (by the saliva) of the margins of enamel against which the gold has been thoroughly packed and finely finished.

In view of all which I have stated I could not have any other than a "desire to test ('for the benefit of others') the results which follow the use of gold *vs.* plastic materirls;" for which purpose, and to give Dr. Flagg an opportunity to "sustain the conditions of the challenge," I am "anxious to work *with*" him in any such case as referred to in the "challenge" he mentioned. Since Dr. Flagg believes that, "as a rule," "first-class" operators do not understand the treatment of diseases connected with the teeth, while I contend that no one can really be a first-class operator unless he can avert or arrest pathological manifestations, therefore, I earnestly desire to take that part of the case to be selected where disease may be most occult, or chronic and erratic, as well as where the most extensive and difficult operations may be necessary. I would, however, wish Dr. Flagg to perform operations upon incisor, cuspid, bicuspid, and molar teeth, where tissue has been considerably broken down, as well as operations of a minor character. I would rather that he select the case, and that appointments be made for the performance of the operations at whatever time and place we may select, and in the presence of any practitioners who may attend.

Since this, my response to the "challenge" which Dr. Flagg mentioned in his lecture upon the "Electro-chemical theory," was communicated to him, he has said that although not now intending to enter into the arrangement to the extent we have indicated, yet he will be glad to perform a few operations between ourselves; but even then other practitioners should be present during the performance and subsequent examination of the operations, and especially when "*the action of filling material upon tooth-bone*" (dentine or enamel), "when each material is to be *tested* with the view to the gaining of some *re-*

liable basal data in this controversy;" when "it is to decide this. for the benefit of others." and when, too, it is intended "to test the results which follow the use of gold *vs.* plastic materials."

I heartily concur in, and hope Dr. Flagg will not depart from, the following which he has written, viz., "I shall be most happy to do anything with you, as a co-laborer, which shall eliminate that which we desire to obtain," but I would suggest "eliminate" all that *obstructs* the attainment of that which we desire.

In reference to the "easy, comfortable, and comparatively inexpensive work" of which Dr. Flagg speaks. I would say that about the same time is required, and degree of pain inflicted, to *properly* prepare a cavity for the reception of one material as for another; but while a greater expenditure of time is necessary for the further (and usually painless) and final performance of the operation with gold or tin than with a "plastic material," yet time itself (and that which is generally meant by the term "expense") should not be considered when excellence or perfection is sought, and this ought to be the operator's object when performing each and every operation. There can be no real excellence without the expenditure of time, energy, and skill, and "value is how much of mind is put into any matter."

PROCEEDINGS OF DENTAL SOCIETIES.

AMERICAN DENTAL ASSOCIATION.

Fourth Day—*Morning Session.*

The meeting was called to order at the usual hour.

On motion of Dr. Dean, the following gentlemen were unanimously elected honorary members of the association: J. Smith Turner, M.R.C.S., Charles S. Tomes, M.A., M.R.C.S., John Tomes, F.R.S., M.R.C.S., all of London. E. Magitot, M.D., Mordaunt Stevens, M.D., D.D.S., M.R.C.S., Paris. Fr. Wedl, Vienna.

Dr. Hawxhurst offered the following amendment to the constitution:

Add to the first clause of Sec. 4, Art. III., the following:

> "No dental college shall be eligible to representation in this association which does not require two courses of lectures as a condition of graduation."

Laid over for one year.

Dr. Taft spoke to a question of privilege, and, in the same connection, Dr. Allport offered the following resolution, which was unanimously adopted:

> *Resolved*, That this association fully indorses the action of its treasurer, Dr. W. H. Goddard, in exacting dues of all members before allowing them to take part in the proceedings, as in so doing he is only carrying out the law.

Dr. Kulp tendered the thanks of Dr. Winn, of China, for the courtesies extended to him.

The regular order was then proceeded with, and the subject of Operative Dentistry was taken up and opened for discussion.

Dr. Corydon Palmer said he wished to correct a statement in last year's proceedings, where he is reported to have said that when we have filled a tooth we have only done that which any jeweler could have done a great deal better. He was quoting from another person when he said that, and did not intend to say what the words imply.

[Dr. Palmer here described, by means of blackboard illustrations, his method of restoring the crowns of teeth which have been worn down by attrition, which has already been illustrated in the DENTAL COSMOS, June, 1875.—*Reporter.*]

Dr. Hall, of St. Louis, spoke in regard to cases of replanted teeth operated on by himself and Dr. Morrison. They had had about one hundred cases, and out of these some half a dozen had been failures. These were due to three causes: disturbance of the socket; destruction of the alveolus in extracting or replacing the tooth; or to improper support after replanting. They had also had two cases of transplantation that were eminently successful; one being a third molar transplanted to the place of the second molar. One apparently dead tooth on being opened into bled profusely, and could not be stopped; it was extracted, and the root found to be only partly developed, owing, it seemed, to a blow received some years before. It was replaced, and the root filled with gutta-percha, and was doing good service five months after.

Dr. Waters, of Boston, said he began replanting teeth nine years ago. His second operation was in his own mouth; a lateral incisor which he took out at 8 P.M., and returned at 11 next day. That tooth did good service for five years, and the loss of it was purely accidental, it being knocked out by accident. His next case was the transplanting of a bicuspid from the mouth of one of his children to his own; the pulp was removed and the root filled with gold. The tooth was extracted on the 12th of January, and placed in a bottle of carbolated water until the 23d of March, which was his fiftieth birthday, at which time he had a root extracted from his own mouth, and the bicuspid was planted in the socket. The inner cusp had to be ground off to make it articulate. It has been a servicable tooth ever since.

Dr. Taft. There is as much necessity now for putting in practice the knowledge that we have, and for living up to our attainments in our daily practice, as for acquiring new ideas. One of the papers seemed to indicate a turning back to former methods and modes of practice, and it is frequently said in our discussions that it is time we should turn back and retrace our steps. Why should this be done? Are the present modes of practice deficient? Are we failing to accomplish what was accomplished years ago? If so, it is a sad commentary upon the manner in which we perform our operations. Knowledge has vastly increased; new modes of treatment are discovered; instruments are more perfect; materials are improved. If under these circumstances we do not improve, we are going back. Let us be stimulated to use all these things in the best possible manner. Gold has been criticised as a filling material, and amalgam recommended. There has been a new amalgam every year for twenty-five years; each one has been perfect,—better than gold. They have all signally failed. Some amalgams may be made that will remain in the mouth for years. No one denies that; but where there is one success, there will be many failures. That was the result of his observation; he had never used it, and he did not think it necessary, in order to have an opinion, that he should have gone into it to the depths of its degradation. The increased use of this material is a sad feature of our profession.

Dr. McDonald thought he would not be understood as making excuses for amalgam, yet we should not say it never should be used. A man that fills with nothing but gold is liable to do half as much injury as a man who fills all teeth with amalgam. There is a class of teeth that cannot be saved with gold,—teeth which are frail or of poor structure. Why should a patient be put to the torture and expense of large gold fillings in these teeth? It will not compensate them. Gold is best for good teeth, but under other circumstances soft fillings are the best.

Dr. Thomas said he had had fifty or sixty cases of replanting during the past two years, and believed it possessed some great advantages in our present mode of practice. In half the cases, he has found that the pain of treating in that way was much less than in the ordinary way, as well as the time consumed. In one case, which was much discolored and out of place, and had been treated for five years without success, he had removed the tooth, and found that in the various operations it had been cut about half off, towards the apex. He cut the root completely off, polished, and replaced, with little hope of success; but it grew firm and regained its normal condition, and a year and a half afterwards was doing good service. He thought it was possible, where teeth are worn down, to extract and replace so as to make them a proper length.

Dr. Barker said that what he predicted is coming true; we are rushing into this matter of replanting without consideration. The elongation of teeth could be accomplished much more effectually by means of ligatures than in the manner suggested by Dr. Thomas. Unless drainage is provided for in the operation of replantation, success cannot be expected. He had had an experience in replanting of so unfortunate a character that he never cared to replant another. At the same time he believes that it can be successfully accomplished. The less injury done to the alveolar plate, the more chances for success.

Dr. Rawls reported a case which he had previously spoken of at the meeting of the Mississippi Valley Association. He extracted the tooth, a lower bicuspid which had been in a state of chronic inflammation for a year, went to his engine and began to operate on the tooth, when the patient, who had been partially anæsthetized and was lying in the chair, instantly, upon the bur touching the dentine, screamed as if she had been shot. She said he was cutting the tooth. He then went out of her sight, and attempted to remove the nerve with a broach, when she jumped up and told him he was touching the nerve. This was repeated several times while he was removing the nerve, and each time she told him what he was doing, though she could not see what he had in his hand nor observe his motions. A stream of water thrown into the tooth caused an exclamation. Finally she went into the other room and remained fifteen or twenty minutes, engaged in conversation; he (the speaker) then returned to the operating-room, and, with the wall between himself and patient, began to operate on the tooth, holding the instrument over it and then making a sudden gouge into the cavity, when the lady, who was quietly talking with her husband on another subject, jumped out of her chair, and told him he was cutting the tooth.

Dr. Atkinson. We have just had a rehash of the same coarseness of mental perception that has afflicted us all our days. This case is either true or not true; if it is true, only those who believe in ghosts can explain it (applause). If it is not true, we had better get some of the mourners on the bench, repenting of their sins. If functional action can take place when the bodies are severed from the point of contact, we had better be a little careful how we mutilate the casket of the beautiful ghost that built the casket.

When we seal up a cavity with anything that is indestructible we save the tooth. Is not gold indestructible? Does it not fulfill the conditions when properly inserted? It is want of mental perception that makes us advocate a fallacy. What is the proper method of restoring a decayed tooth but to clean out all disintegrating material and put in something that is anti-fermentative in its nature, and restore the tooth so that the ghost may have the same sized house he had before? That is contour.

Dr. Ingersoll said he did not believe in ghosts or spirits in teeth. He attributed the phenomenon described by Dr. Rawls to an unusual mental excitement, such as is often observed in patients while under chloroform, who say they can see what you are doing when their eyes are shut. There is a sort of mental momentum. A patient will go through the operation when not touched. This patient had the operation impressed upon the retina of her mind.

Dr. Allport thought it made little difference whether abscess was of recent or long standing if the treatment was proper, and mentioned a case of twenty-three years' standing which was successfully treated. All diseased portions must be removed. Sometimes this can be done with instruments, and sometimes with chemical agents, and sometimes it cannot be done at all. If the root is not made perfectly smooth it will be of no use to treat it; it makes no difference what you do. Teeth can be replanted and retained in a healthy condition for a short time, but the question is whether they will be so for any great length of time. He had had a case replanted after being knocked out by an accident twenty years ago, and to-day it can hardly be distinguished from a live tooth; but the alveolus is absorbed, and the apex protrudes and cuts the lip. He had yet to see the case that had been in over five or six years, that was in a healthy condition. The question is, is it worth while to replant these teeth? His opinion was that they would never prove permanently durable.

Dr. John Allen said he had extracted teeth when very sensitive, filled, and returned to the sockets, and the patients declared they had not suffered as much as if filled in the ordinary way. He spoke of a case where the four front teeth were knocked out and lay in the sand for two hours; they were cleaned and returned to the sockets, and twelve years after they were good teeth and of good color. The pulps were not taken out. He believed the pulps reunited at the apex.

The subject of Operative Dentistry was then passed.

Mechanical Dentistry was taken up, and, after the reading of a short letter from Dr. Morrison, of the committee, was also passed.

Dental Education was then taken up, and Dr. Fillebrown read a paper upon that subject. The following is an abstract of this paper:

The report was confined to the consideration of the following points: dentistry a specialty in medicine; a thorough medical education essential to the most successful dental practice; the expediency of existing medical schools including dentistry in their course of instruction; and lastly, an account of some action that has been taken by several societies, and suggestions as to the action this association should take on this subject. The first proposition was stated to be beyond question, and admitted by all. That a medical education is essential to the practice of dentistry is not so universally admitted. A medical education is but the foundation which prepares its recipient to perfect himself in whatever specialty he may choose. An ophthalmic surgeon, though he might do much good without it, yet needs a thorough medical education. Surgery of the eye and of the teeth are as intimately associated with each other as are their anatomical locations. Inflammation of the dental branch of the fifth pair of nerves differs not from that of the ophthalmic branch; nor is ulceration of the mucous membranes of the mouth and eye dissimilar. The treatment in these and other cases is governed by the same principles.

It is conceded that, other things being equal, the medically-educated man is best fitted to practice dentistry. When a medical graduate attends a course of lectures in a dental school a noticeable respect is paid to his superior acquirements, and he will almost pass without examination. The greater includes the less, and the medical graduate has only the handiwork and technicalities of dentistry to learn. As a rule, those who have done most to elevate and improve dentistry have been medically educated men. Our literature is the product of the same class. Of sixty-eight standard works, fifty-two were written by graduates in medicine, and the remainder are the least important.

Dental science is a part of a whole. It is impossible to understand a part without understanding the whole. A practitioner to be a good specialist, must also be a good *generalist*. The operator who treats abscess, ranula, and necrosis needs medical knowledge as much as he who cuts for cataract or enucleates the eye. The effects of pregnancy and lactation upon the teeth are such as to refute the idea that a knowledge of this subject is superfluous. The subject of anæsthetics also demands a thorough understanding of the best means to control their influence.

The expediency and wisdom of medical schools including dentistry in their course of instruction appears for the following reasons: more schools and more widely distributed are needed, so that more inducements and facilities may be offered to young men to obtain a good education, instead of fewer schools and better, as has been advocated. Where a professional school is located, there will exist a higher standard of professional excellence; where a dental school is established, there will be superior operators and superior patients. The establishment of new schools has not injured those previously existing, nor would any such suffer by opening the doors of medical colleges to dental students. The faculties of dental schools are deserving of all honor; they have advanced as fast and as far as the profession would support them, and their hands should be upheld. The proposition to include dental subjects in a medical course implies no reflection on them. Their advancement will sooner or later compel them to cover more and more of medical instruction. The ideal dentist will first graduate in medicine and then take a post-graduate course in dentistry. Few, however, will do this; and while taking a medical course there will be ample time for becoming familiar with the specialty of dentistry. The few mechanical principles governing the filling of a tooth can quickly be understood, and not many months of practice are required to acquire their application. The same applies to artificial work. But general principles can only be acquired by a prolonged effort extending over years; and no amount of simply *dental* knowledge will give a man more than a partial culture. Another reason for the plan advocated is that in case a student makes a mistake in entering the dental profession he may easily correct it, if medically educated, by entering that profession, and the contrary might also be true.

The question whether the medical profession would take sufficient interest in the matter to extend sympathy and support to such a cause may be answered by referring to the action taken by several societies. The Maine Dental Society, in 1876, passed a resolution declaring a thorough medical education essential to a successful dental practice, and also that it is expedient that medical schools add dental instruction to their curriculum. The Merrimack Valley Society also passed similar resolutions, as did also the American Academy of Dental Science. The Cumberland County (Maine) Medical Society also declared for a more thorough education for dentists, and for dental instruction for medical students, sufficient to fit them for practice on graduation. As a sequence of this action, the Portland Medical School added a dental instructor to their faculty.

The report concluded with a preamble and resolutions, which were offered for adoption; but, on motion, a vote was postponed till the close of the discussion upon this subject, in which place they will be found.

Dr. Crouse then read a report upon the same subject, of which we give a synopsis, as follows:

The paper stated that though this subject had been much written upon and discussed, yet reforms were necessary. The profession is being filled with men who, having neither brains nor application, choose the dental profession as involving the least loss of time in preparation. Each year witnesses an increase of these unqualified practitioners, a large proportion of whom have never attended lectures or had proper office instruction; yet they enjoy the patronage of intelligent people and a remunerative practice. How is this to be remedied? A move in the right direction was made by this association in refusing to receive delegates hereafter unless they were graduates, and in recommending that local societies take no students for less than three years. The Illinois State Society has adopted this resolution, and also requires the preceptor to take a written obligation from the student to graduate regularly. But the colleges must go deeper. Requiring an eight months' course is an advance; but in order to enforce this and other rules the advantage of colleges must be so great that students will feel that they cannot get along without them. The colleges are doing all they can with the support they receive. In 1870 the committee on education urged that the number of dental colleges be lessened, and that a few educational centers should be well established and sustained. There were then nine colleges, with an average of three or four graduates to each professor. Since that time they have increased to twelve, with several in embryo. It has not been discovered that the patronage has been such as to demand this. The question is, why colleges are still formed to further hamper those already in existence. Is it to further the interests of the profession, or of the projectors? If they cannot offer increased facilities, they are only hindrances.

As the public know less about the qualifications of a dental practitioner than any other calling, the dental diploma should be of sufficient consequence to insure the respect and confidence of the public. There will then be less temptation to young men to be dishonest. At present too large a portion of graduates resort to unprofessional conduct to gain business. The instructors in colleges should take special pains to guard this point. The selection of students is also important; no college advantages can avail with dunces. Reform here is difficult, if not beyond control by anything short of legislation, because a large proportion of students are taken by incompetent men beyond the influence of our societies, who are purely mercenary in their object. Being made to perform servile work while perhaps paying for instruction, the student soon concludes that he is being imposed upon, and none but dolts will endure it. The great need of our profession is better material for students, the selection of only young men of ability, of physical strength, and general adaptation to the calling.

Dental societies and clinics have conduced to the advancement of the profession more than anything else. With all that societies can do, other professions will not recognize us as equals until our colleges rest upon a different basis. The obstacles to solving the question are the multiplicity of existing colleges and lack of means to place them on a good financial basis. If the divided and subdivided patronage now enjoyed were given to the colleges actually needed, they would be placed on a firm financial footing. Endowments and State appropriations may be suggested as means which would accomplish this end. If the number were reduced and the standard raised, the former might be secured from within or without the profession. State appropriations are more feasible, and will probably ultimately be adopted.

To the State of Michigan belongs the honor of making the first appropriation for dental education. Our colleges should rank above the best institutions of learning, for two reasons: until they do, and the graduates they send forth are superior to those of other schools, our profession will not receive the recognition we desire; and also because in an occupation like ours, which is so taxing when actively practiced, there is neither time nor inclination for active study when once engaged in practice; and the preliminary education should therefore be more thorough. This question should be discussed till some revolution shall be effected which will place our colleges foremost among educational institutions.

Adjourned.

Afternoon Session.

The meeting was called to order at the usual hour.

Resolutions of thanks to the proprietor of the Grand Pacific Hotel, of Chicago, were adopted.

The committee on nominations made their report, which on motion was accepted and adopted as follows:

Physiology.—M. S. Dean, J. H. McQuillen, C. W. Spalding.
Pathology.—W. H. Atkinson, G. R. Thomas, D. C. Hawxhurst.
Histology and Microscopy.—G. V. Black, G. F. Waters, C. N. Peirce.
Chemistry.—T. L. Buckingham, L. G. Noel, W. A. Bronson.
Therapeutics.—F. M. Odell, L. C. Ingersoll, C. C. Chittenden.
Operative Dentistry.—H. A. Smith, L. D. Shepard, M. H. Webb.
Mechanical Dentistry.—A. L. Northrop, H. H. Keith, W. N. Morrison.
Education.—J. N. Crouse, Thos. Fillebrown, Geo. J. Friedrichs.
Literature.—C. D. Cook, A. H. Brockway, W. H. Morgan.
Etiology.—D. C. Hawxhurst, D. W. Clancy, J. Frank Marriner.
Prize Essays.—H. Judd, W. W. Allport, C. S. Stockton.

The commmittee on instruments and appliances made their report, which was read by Dr. Brockway.

The subject of Dental Education was then taken up and opened for discussion.

Dr. Atkinson. The difference between a dental and a medical education is only the difference between the body and any of its members. Until we can breed teeth without doing so in connection with the whole system, we must acknowledge the unity of the body. It is mere verbiage to say that there is a dental profession distinct from the science that underlies the ability to diagnose and prescribe. It is sheer nonsense.

Dr. Taft. There is no dental profession that ignores a medical education.

Dr. Spalding said that nobody that he knew of claimed that there is a dental profession separate from the medical. Something, however, is claimed. We are casting about for something to be done for an improvement of the dental profession. It is easy to paint a dental millennium, but how can we realize it? It is chimerical, impracticable, and beyond the reach of the present generation. We must take things as they stand. We cannot create the material, we can only take it as it comes to us. If we find unqualified men seeking to enter the profession, let us kindly advise them to wait till they are prepared. Let us set our standard as high as we can with our present facilities. Our medical schools, as now constructed, are not the best means; hence, we must teach medicine in our dental colleges from a dental stand-point. We know better than medical men what we want. If a student could comprehend the whole range of knowledge, I would say amen; but if only a portion, let it be the most essential parts first.

Dr. Barker said he had got over the sentimentality that requires us to claim fellowship with a profession that utterly disclaims fellowship with us. The medical profession ignores us,—let us drop our claim to relationship, and stand up as *dentists*, and be proud of it. Let us not teach young men that they can learn all medicine at once, and at the same time become practical dentists. Diplomas are comparatively valueless, because they are so multiplied. Institutions are ephemeral. We cannot be too sudden with our improvements. The colleges are the mouth-pieces of the profession, and the best men do not uphold their hands. Medically instructed men do not make as good dentists as if they had been thoroughly instructed in a dental college. They are conceited. There are too many colleges; two would be enough, and no one should be professor who is not a practical dentist.

Dr. Judd. There is a unanimity as to the necessity of a high degree of learning. The question is, how is it to be attained. Dentists may perhaps teach medicine, but not as well as medical men. It would be strange if they could compete with colleges that have age and experience, the largest learning, and the best talent. All our talk in these associations is upon medical subjects,—the cure and treatment of disease. The manipulations are taught in every society. So far as dentistry and medicine go together let us avail ourselves of medical knowledge, and where they diverge let us complete the dental education. His experience with medical men differed from the last speaker's; he had always found them courteous, kind, and respectful.

Dr. Black, of Illinois, said he had had considerable experience with medical men, and had always been treated with courtesy, and the same as a medical man would be. Anatomy, histology, physiology, etc., are better taught in medical than in purely dental schools. If we eliminate the medical branches from dentistry we have left only metallurgy and mechanics. We are reduced to mechanics, or we are medical men. If we are going to be mere fillers of teeth, let us give over the treatment of disease to medical men, but if we are going to treat disease, let us prepare for it in medical colleges.

Dr. Osmond. In looking over college circulars, dental or medical, *fees* seem to be the principal thing. Graduation fee, $30. That does not look right. One college gives a diploma free. A student might pay to be admitted, but ought not to pay for a diploma. It looks like buying a diploma; savors too much of the shop.

Dr. McQuillen. No honorable man would suppose for a moment that diplomas are sold. It is a custom all over the world to charge for them. It is said there are too many colleges. How many practitioners are there? If ten thousand, then do they not have five thousand, or, at least, three thousand students or office boys? There are twelve schools, which can accommodate, say twelve hundred men, but they do not have that number of students.

The medical colleges are increasing their curriculum; the University of Pennsylvania now has sixteen professors. Must the dentist take this in addition to his regular course?

The speaker then quoted from Huxley, who had expressed the opinion that "although he respected a liberal education as much as any man, yet a pressure was put upon all persons to give only a limited time to their studies, and they must be limited to those which it is absolutely necessary that they should have well in hand. If they do not so concentrate their efforts, though they may be accomplished and versatile, they will not have the confidence of either themselves or patients. They may be liberally educated, but they will not be good practitioners. It is the first duty of every man who sets himself up before the public to do a certain thing that he shall be able to do that thing, whether he can do anything else or not." A man may be over-educated; you may attempt to pour more into him than he can hold He wished the colleges could be endowed, but it is at present a Utopian idea. The best medical colleges do not pay a salary that is an object.

Dr. Ingersoll. If medicine embraces the entire organism, then dentistry is a branch of medicine; but, in the popular sense of the word medicine, it is not a specialty of medicine. The man who graduates from a medical school is supposed to be capable of treating the eye and ear, and of general surgery. Now if we add dentistry to the category we do away with the dental profession entirely; medical graduates will be considered competent to practice dentistry, and they will be doing it. They do it now. They send in to him, because he had lectured in the medical college of Keokuk, to pick out their instruments; and they generally want two burs, two excavators, and two pluggers, and that is their idea of practicing dentistry.

Dr. Fillebrown. As medical schools are constructed, they are not fitted to teach dentistry. They must be reconstructed. The professors must be practical dentists to teach dentistry, but an anatomist need not be a dentist. So with physiology, materia medica, etc. A three years' course will not over-educate a man. Dental schools should enlarge so as to include dental instruction; they are old schools, based upon the knowledge of ages.

Dr. Crouse. It is true that in many cases medical colleges are not what they ought to be, or what we want. Instead of their graduates being fit to treat the eye and ear, they are not fit to practice anything till they have gone out and abused the community a number of years and made many mistakes. Many get disgusted, and abandon it, and it is a good thing they do. If he were to take his own course over again, it would be very much more thorough; he would not be in such a hurry to get into active practice.

Dr. Spalding. The question is not what we desire, but what is practicable to-day. Is it practicable that medicine and dentistry should be united in one man to-day? The material upon which we work and the means at hand are not sufficient. If we send them to the quacks they will disgrace the profession. Dentists should be taught by dentists, and not by doctors. Medicine is his right hand man, and his best friends are medical men, and he regrets the attempt to array the professions against each other. That good dentists can be made in medical schools, as they are now or are likely to be constituted, is entirely Utopian. If the arrangement is to be made, the proposition should come from them. Physicians ridicule dentists now for asking recognition. The editor of the leading medical journal of the country says that before dentists can be recognized as a specialty of medicine, the whole profession must be reconstructed.

The rules were then suspended in order to vote upon Dr. Fillebrown's resolutions, which were as follows:

Whereas, Dentistry is a specialty of the science of medicine.

Resolved, That we esteem a sound and thorough medical education essential for the most successful practice of it.

Resolved, That we deem it expedient for the best interests of the profession of dentistry that existing medical schools enlarge their courses so as to include efficient instruction in dentistry, in order that it may be placed on an equality with other specialties of medicine.

A division of the question being called for, the preamble and the first resolution were put to vote and carried. The second resolution was lost. The subject of Dental Education was then passed.

The subject of Dental Literature was then called for, and Dr. Shepard read the report of the committee, of which the following is an abstract.

The report opened with a reference to the immense progress made in our art, which, scarcely a century old, numbers its ten thousand votaries. Observation of the written and oral efforts, on the subject of the steps by which dentistry arrived at its present importance, shows that *results* have been much more thought of than the causes which have produced present conditions. The discovery of causes has been subordinated to the observation of effects; that is to say, practical dental art has made great strides, while theoretical science, which should have preceded, has hardly kept pace with the former. This conclusion is indeed inseparable from the first growth of any science; still it is true that the student aims not only to accumulate facts, but to evolve causes from effects, and thus lay a substructure of theory by which to govern further observation. The literature of any science which has the most effect for good, is that which treats of cause rather than effect; and such a literature in any profession is a foundation of truth which cannot well be destroyed. Has American dentistry such a literature? The dearth of scientific dental books is to be deplored, and the appearance of such is occasion for congratulation. Such a one is the "Manual of Dental Anatomy, Human and Comparative," by Chas. S. Tomes, recently issued. Though intended by the author simply as a student's manual, it is eminently adapted to the wants of practical men in the profession. A dearth of knowledge as well as appreciation of this subject is widespread.

It has been said that thoroughness in any one science can be had only through an intimate knowledge of all the others. Without going so far as this, it is safe to say that acquaintance with comparative anatomy is of vast importance in the study of structural human function, and this gives this work its great value. The chapters on the teeth of fishes and reptiles are the results of original investigation, and reflect great credit upon the author. In the remainder of the work the author has used any material available, and in some portions the book resembles parts of the work on dental surgery by the elder Tomes. The work embodies the principal recent accessions to our knowledge, nowhere else found in a collected form, and must attain to importance both as a text-book and a manual of reference.

A third edition of Taft's "Operative Dentistry" is this year presented, revised and enlarged. As a text-book it is of great value. The objection to this, as to former editions, as a work of *scientific* authority, is that while it presents the *alpha* of professional acquisitions, it does not attain their *omega*. This may perhaps be impossible; and the work receives the highest praise when it is said to stand alone as a student's text-book. An appendix is added, containing descriptions of Dr. Corydon Palmer's plugging instruments, the electric and pneumatic mallets, etc. It is still stated that Dr. Atkinson introduced the mallet, in spite of well-known proof, and Dr. Atkinson's assertions, to the contrary. Hand-filling has properly received exhaustive treatment, but the various methods of mallet-filling are hardly noticed. Had this been done, the work would have been more complete and valuable.

The production of so great an amount of serviceable material as annually appears in the transactions of societies, is matter for felicitation. The essays and discussions, when freed from a deal of extraneous matter, constitute a great amount of information which would benefit the student and practitioner. A stricter censorship over publication is to be desired, and it is to be deplored that so much time and ability are wasted on little matters of mechanical execution. The youth of the profession will, however, excuse much, and we may expect better things.

In regard to dental journals, two opinions have obtained,—the one, that the publication of dental journals by manufacturers, is a drag upon the progress of the profession; and the other, that almost all the advance in dentistry in the last thirty years is due to this connection. Neither extreme is wholly correct, although each has some grounds for existence. Appliances have undoubtedly grown in number through advertising in the journals. An excess of these must tend to lower the standard of scientific attainment. A multiplicity of instruments may, however, be so applied as to further scientific research; yet a glut of materials will form to the man of ordinary mold a troublesome barrier to depth of thought.

The literary character of the contents of the journals is not the highest. A subject should not be written upon, much less for the press, until deeply considered and thoroughly natured. Yet the temptation to get into print is powerful, and the facilities offered by journals are taken advantage of. Thus much is admitted which is worse than useless, and the effect upon untutored minds is deplorable.

But it is also true that interchange of opinion and thought in the pages of the journals has been the cause of much progress, and thus the harm done has been balanced. This fact is an argument in favor of a better and higher journalism. If so much has been done by present methods, how much more valuable will be periodicals that promulgate only the good, and improve the mind while directing the fingers? There is a necessity for reform, and that of a general and not of a specific character. The principles upon which we found our achievements should constitute matter for our writings and discussions, rather than the achievements themselves; causes should be searched for and understood, while effects should assume a secondary place. Actual scientific efficiency should rank higher than manual dexterity.

The subject of Etiology being called up, Dr. Hawxhurst, chairman, and Dr. Webb, a member of that committee, each read a report. We give a synopsis of Dr. Webb's paper; Dr. Hawxhurst's has not been received.

Dr. Webb's paper stated that, when a sufficiency of rich pabulum is furnished, and there be regular aggregation of atoms, molecules, and granules, the cells build up perfect tissues and organs, which, embodied, constitute a system. Anything that interferes with the richness or the appropriation of pabulum induces abnormal tissues. The perfection of supply and appropriation is physiology; any departure from it is pathology, and implies diseased action, the cause or causes of which is denominated etiology. This is not as yet understood sufficiently to enable us to detect all that interferes with nutrition. There may be remote and proximate causes of disease. The demand for the phosphates, during the development of the system, is not always fully supplied, or the elements may not be properly assimilated, and this may lead to disease. Many causes are constantly tending to disease all through life: inhalation of air charged with parasites and disintegrating substances, drinking water containing impurities, and the taking of improper food, all act as factors of disease. The cells may be so interfered with through systemic disease that the building up of tissue is retarded, and in the developed organ may be seen a line between the unarrested and arrested development, such, for instance, as is often observed in enamel where the arrested development is recorded in indelible characters. Exanthematous diseases cause such a suspension of nutrient action, and imperfect development follows. This may exist and not be manifest till diseased action ensues. Abnormal tissues may lie dormant throughout life, and not be suspected. The form of the organs may be changed through imperfect development. If the system is seized with a spasm at a time when the enamel is not fully calcified, the coronal portion of the organ may be changed. This should be borne in mind before attributing such malformed organs to syphilitic taint.

Disease may lead to a retrograde metamorphosis, and this may be transmitted through hereditary influences. The typal presence asserted in the parent is manifested in the offspring, and this is often markedly the case in the dental tissues.

Proximate causes of disease consist in the modification of the presentment of the modes of life. Extremes of heat and cold may act as proximate causes of disease, by accelerating or retarding functional activity, or interfering with neural and vascular circulation. In enamel, with its about ninety-eight per cent. of mineral elements, they may merely produce minute fractures, and the consequent interference with nutrition may cause caries. The proximate cause of disintegration of enamel and dentine seems to be due almost entirely to acid. There are, however, phenomena which cannot well be explained, either by chemistry or physics; yet as chemistry advances to a more perfect state, and biology is better understood, physiology may be found to be the highest and most perfect manifestation of organic chemistry, and we may be better prepared to search out and comprehend the remote as well as the proximate causes of disease, which can only be fully understood when pathology becomes an exact department of science.

Dr. Barker declined the chairmanship of the committee on etiology, and on motion Dr. Hawxhurst was substituted.

Dr. Judd offered the report of the committee on popular education, appointed some years since,—the same being a printed pamphlet prepared by a similar committee of the Illinois State Dental Society. The report was accepted, and laid over for consideration at the next annual meeting.

The committee on prize essays made a report to the effect that they had received one essay for examination, but did not think it of sufficient merit to entitle it to the prize. Resolutions of thanks to the Chicago Dental Society were then adopted. The local committee of arrangements for next year was appointed by the chair as follows: Drs. G. C. Daboll, Buffalo, G. L. Field, Detroit, and C. R. Butler, Cleveland; also the publication committee, Drs. Cushing and Judd.

The newly-elected president was then conducted to the chair and introduced, and the retiring and incoming presidents each made a few appropriate remarks, after which the association was declared adjourned, to meet at Niagara Falls on the first Tuesday in August, 1878.

NEW YORK ODONTOLOGICAL SOCIETY.

Special meeting of society held January 9th and 10th, 1877.

January 9th, evening session, at the residence of Dr. Benjamin Lord, No. 34 West Twenty-eighth Street.

President A. L. Northrop in the chair.

Dr. J. B. Rich called the attention of the meeting, in a few well-chosen words, to the recent death of Dr. Archibald McElroy, and, on motion, Drs. W. A. Bronson, C. A. Marvin, and Wm. Jarvie, Jr., were appointed a committee to draft suitable resolutions.

Dr. S. G. Perry, of New York, then read the following paper, entitled "Description of the Operation of Attaching an Artificial Tip to the Broken Crown of an Incisor Containing a Living Pulp."

Mr. G. presented himself for an operation on the right superior central incisor, the tooth being broken, as shown by the accompanying cast. The pulp alive and healthy. The break, although so slight, gave to the mouth the appearance of a tooth having been lost. It also affected his speech, causing a whistling sound in the articulation of certain words. Having to speak somewhat in public, he had grown sensitive about it, and was very anxious to have it remedied. A dentist whom he had consulted suggested the building on of a gold tip, but he objected to that as being conspicuous and unsightly, although he was well aware that it would correct his speech. Commenting upon the rapid strides recently made by dental science, he asked if it was not yet possible to securely attach an artificial tip to the crown of such a broken tooth.

Pointing out the difficulties of such an operation, and the comparative insecurity of a tip thus attached, I advised that the tooth be let alone, but recommended that the ends of the adjoining teeth be taken off a little, that the break might not seem so great. He was not willing, however, to let it remain, preferring even to have an artificial tooth substituted. I consented, therefore, to undertake the operation of attaching an artificial tip, assuring him that if failure resulted the pulp could be devitalized, and a crown then put on that would be permanent.

The plan I determined on was to cut a large cavity on the lingual surface of the tooth, and pack gold into it over a strip or tongue of gold plate soldered to the tip. I proceeded with the operation in the following manner: With the engine I ground the tooth down transversely as near to the pulp as I thought safe, in order to allow as much length and strength to the tip as possible, as well as to carry the joint between it and the tooth high up, that it might escape observation.

I also ground away a portion of the enamel on the lingual surface of the tooth, in order to expose the dentine, which I then readily cut away down near to the pulp, and in such a manner as to give room for the tongue of metal that was to be soldered to the porcelain tip. Along the margins of this large cavity, and on each side of the pulp, I cut a deep groove, into which I intended to anchor my gold.

Also, in the center of the lingual surface, but near the gum, I cut a small round cavity, of the same depth as the large one, and connecting with it by an opening smaller than the small cavity itself, forming thereby a dovetail, into which the end of the gold tongue was to be fitted.

A plate tooth with cross-pins was then selected, and ground to accurately fit the cut end and labial border of the natural tooth. To this tip a gold backing was fitted, and to the backing was soldered the tongue of gold, which was then bent to fit the floor of the large cavity, and its extremity dovetailed into the small cavity.

This tongue could not be very wide and allow room for packing the gold into the grooves on each side, nor could it be very thick. It was stiffened with solder, however, at its junction with the backing,—its weakest point.

Near the middle of its length it was narrowed, so that when the gold was packed over and around it, it would be dovetailed in. A little knob, or projection, was also soldered on its upper surface, over the neck that was to rest in the junction of the large and small cavity. This was done to give it greater strength at this narrow and weak point, as well as to form another dovetail. after the gold was packed.

The object of this small cavity and the dovetail formed by it was not alone to give strength to the tooth after the operation was completed. It was also intended to aid very materially in the performance of the operation itself. It can be readily seen that with the joint between the tooth and the tip made perfect. unless the tip could be held in place with absolute firmness, there would be danger of displacing it and opening the joint by the force and jar of packing the gold over the tongue. Therefore, sinking the dovetailed extremity of the tongue in the small cavity—which was to be partly filled with thin oxychloride—would secure that end from the danger of vibration or movement. The tip was to be held in place in a manner soon to be described.

After the rubber dam was applied and the tooth made perfectly dry, a little thin oxychloride was laid along the center of the bottom of the large cavity, as well as into the small cavity. A little was also laid along the inner side of the end of the natural tooth. It was not allowed to extend out to the labial border, as I believed that a more durable joint could be made by an absolutely close adaptation of the two surfaces than by interposing any destructible substance. (Such, at all events, has been my experience in a number of somewhat similar cases, several of them having now stood a number of years without showing signs of change.)

The joint in this case was made with the utmost care, and with the aid of the magnifying-glass.

The tooth was then fixed in place, being applied in such a way as to force the excess of oxychloride towards the lingual side. Fixing the tip in its place on the tooth implied setting the tongue to its place on the floor of the two cavities, as well as the expression of the surplus oxychloride. The tip was then held firmly in place for a few moments, and the oxychloride allowed to set.

The next step was to provide the means of holding the tip in place while the gold was being packed. This was done by fitting a band of brass, about one quarter of an inch wide, around the front teeth. extending from the first bicuspid on the right to the first bicuspid on the left. Opposite the central on which the tip was placed this band was bent out somewhat, to allow a space between it and the tooth. Holes were punched in the band opposite each bicuspid and each lateral.

Through these holes floss silk was passed, and tied as tightly as possible around the four teeth mentioned. In order to fix the band more firmly in place than was possible to do by tying, four wedges of dry compressed pine wood were pushed under it at such openings as could be found between the teeth. These wedges were then wet, and, swelling out rapidly, held the band surprisingly tight and steady. By the time this was accomplished, the oxychloride, which held the tip in position, had become tolerably hard.

Into the open space made by the bend in the band over the central thick oxychloride was placed in quantity sufficient to form a complete matrix for the tooth and tip. After allowing sufficient time for this to harden, the excess of oxychloride in the cavity was cut away. and the packing of the gold commenced.

The tongue of gold resting on a firm bed in the two cavities. and the tip being held immovably by the matrix. the rest of the operation consisted simply in packing gold into the grooves. and building it up over the tongue and out to the original shape of the tooth. This was done with narrow strips of rolled gold, No. 30. annealed and handled with the nicest care, and packed with that most beautiful of all instruments, the new electric mallet.

After the gold was packed and finished off, the matrix was removed, and the joint found to be perfect. It could be detected only upon close examination. An ordinary observer would notice nothing unusual about the tooth.

I need not add that the appearance of my patient's mouth was greatly improved, and that he was more than delighted. I have since seen him, and I feel confident the operation will be a permanent one.

Perhaps it may be said that. if instead of being cut straight across. the end of the tooth on the labial side had been inclined towards the gum, there would have been less danger of movement of the tip towards the lingual side.

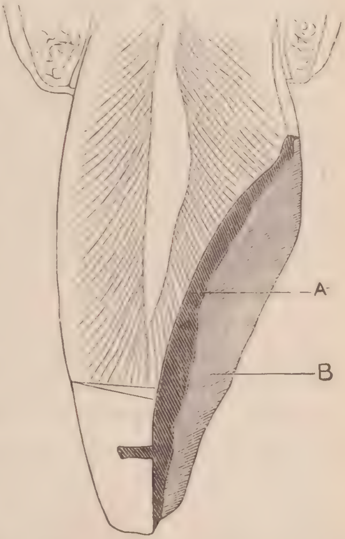
With the tip overlapping the tooth on the labial side, and the tongue of gold securely fixed on the lingual side, it would seem to be supported opposite the two directions from which force would be most likely to come. The additional strength, however, of such a joint, over one made at right angles, may be more apparent than real, for the force of a blow upon the tip from the labial side would tend to spring open the joint, so that to secure much strength the incline would have to be made quite abrupt. With such a joint the strain of a blow would be felt most towards the diminishing external edge of the tip, which, under much tension, might break even before the gold in the grooves has been disturbed.

Of course the more acute the external edge of the tip, at its junction with the tooth, the more danger of its crumbling and rendering the joint visible.

An inclined joint would also be more noticeable than one made at right angles, the translucency of the artificial tip rendering it visible to a considerable depth. I decided, therefore, to depend entirely upon the grooves and the gold for support, and to give the joint that angle which would render it least visible, and which would insure the strongest edge to the tip and the tooth.

It will be noticed, however, by referring to the drawing, that the tooth and tip do not rest in contact only about half of the thickness of the tip. After the joint was made, the end of the tooth was cut away on the border adjoining the cavity. This was done to make room for a little oxychloride, which was allowed to extend over this border, as before stated. By this means only the outer portion of the tip and tooth were in actual contact.

FIG. 1.



The President. I understand that Dr. Bogue is familiar with this operation. Will he kindly favor the society with his ideas in regard to it?

Dr. E. A. Bogue. I do not know, Mr. President, that I have much to say about it excepting that the perfection with which the piece seemed to be attached was quite surprising to me. Its solidity seemed perfect. I suppose that time alone can prove whether Dr. Perry's hopes of the permanency of his operation will be fulfilled. The color was very perfect indeed, with the exception of a little defect upon one side of the tip, which Dr. Perry speaks of in a deprecating manner; scarcely any one not professional would notice the splice which was made. That such an operation should be performed at all, and so successfully, is certainly as great a pleasure to me as it is to the others, I presume, who are familiar with the case.

Dr. S. G. Perry. The color of the tip was perfect before the backing was soldered to it. If it had retained its original color it would have matched exactly with the tooth, but it was made a shade darker by heating.

A Member. I would ask the doctor how he ground the joint?

Dr. Perry. With an ordinary corundum wheel; afterwards rubbing it very carefully on a smooth, flat surface in the same manner as we prepare sections of teeth for the microscope.

Dr. Frank Abbott. I am a little inclined to take exception to the character of the joint that Dr. Perry made. He may be perfectly correct in his position, but I should desire something between the tooth and the tip, for fear of ultimate discoloration. I have had some experience in this direction; in fact, more than I want again. I had an experience of at least six months in trying to put tips on two teeth similar to the one which Dr. Perry has described this evening. The palatal portion of the teeth was nearly the natural length, but on the labial surface the fractures extended half the distance toward the gum. The lady was very desirous of having tips put on which should match the natural teeth in color, instead of gold. I had previously put on pieces of teeth in similar cases, but not where they required to be so small and delicate as in this case. The pulps were alive in the teeth, and I fitted the pieces on very carefully. I did not, however, depend upon grinding away the surface to make the joint perfect, but depended upon some substance between the teeth and the tips to keep the seams tight. I put the pieces on two or three times, but they broke away. I fastened the tips by drilling a hole into the tooth on either side of the pulp, and fitting these holes tightly with hickory plugs. To the porcelain tips were attached small plates with holes exactly over these wooden plugs. Placing the pieces in position, I carried screws of pure gold through into little holes made in this wood, and screwing them up tight retained the tips very well. The difficulty was that every time the patient bit anything hard it cracked off a portion of the tips, and it was six months before I got a fixture that was at all permanent. That was effected by fitting a plate of platinum to the teeth, the size and shape desired, and baking on that a body of the required shade. These were attached in the same manner as the first tips,—viz., by being screwed into the hickory plugs. By this contrivance one of them has stood two years nicely. But it has troubled me to keep the joint from discoloration. I have tried oxychloride of zinc in all ways, thick and thin, as well as gutta-percha dissolved in chloroform. The best thing I have found is Hill's stopping, as near the required color as I can get it. I make a thin layer of that along the surface of the tooth, warm the piece I am using, and press it home tight. I said *one* has lasted two years. The other was constantly breaking away, and I had great difficulty with it until six or eight months ago, when I fitted on a piece of hippopotamus tooth, the right color, and that I fastened on with a great deal more satisfaction than anything that I had used, and it stands better; and if I ever have a similar operation to perform I shall use a piece of that kind of ivory.

Dr. Geo. T. Barker, of Philadelphia. This subject is one of deep interest. I must say, however, that while I have several times had occasion to admire the beauty of finish and mechanical skill displayed in these operations, I am still in doubt as to their practical value. The best one I have ever seen, which was perfect in mechanical execution, stood two years and then failed. Yet, at the same time, we are occasionally called upon to perform operations of this character; and, with a view of securing the best and most permanent results, I have given some considerable thought and experiment to the subject. My experience has convinced me that we can accomplish the most desirable results without putting on any tips at all. I think I could take the case which Dr. Perry has described, and in two weeks' time bring the tooth down on a line with the others simply by the application of a delicate and gradual force. In the case instanced by Dr. Perry,—a tooth in the superior arch,—the occlusion of the lower teeth in mastication, coming as they do within the superior teeth, exerts a force which is all the time pushing against the piece which has been put on,—a force which no substance, however durable in its nature, or however firm its attachments, would be likely to stand permanently. Such a constantly operating force tends to disintegrate any metal. But these cases are amenable to a simple, natural treatment, which is entirely effectual. That treatment I will describe briefly. (The doctor here drew an illustrative diagram upon the blackboard, and described a combination of gold bars, ligatures, and rubber bands, so arranged as to produce a gentle tension upon the tooth to be elongated. When a tooth is thus elongated you have nothing to fear in regard to the tip loosening or breaking away. After the tooth has been drawn down to the required length it can be held in place by a simple fixture until calcification of the plasma, which has been effused into the socket, has taken place. I have performed this operation several times, and have never yet seen any case where it was not quite successful.

The President. At what age are you able to perform this operation?

Dr. Barker. Any time between twelve and sixty.

A Member. What time is requisite for the performance of the operation?

Dr. Barker. I take from a week to ten days. It can be accomplished in twenty-four hours, but in such a forced operation there would be danger of devitalizing the pulp. Where an incisor was unnaturally long I have accomplished the result of depressing it in a line with the others by the same means, varying the arrangement of the loops and ligatures so as to produce an upward pressure. The resisting tissues in the socket are readily overcome, the retrograde metamorphosis which occurs being very rapid.

Dr. J. L. Williams, of Boston. I have treated several cases of this kind under adult age. I should hesitate much about employing the method indicated by the last speaker, after adult age. I think Dr. Perry's treatment would then be preferable.

Dr. Barker. Will the gentleman give his reasons?

Dr. Williams. For fear the method you describe would induce permanent disturbance.

Dr. Barker. What evil result would you anticipate?

Dr. Williams. I know from personal observation that it is attended with injurious results; besides, it is a well-known and accepted principle of physiological science that no joint can be subjected to disturbance or dislocation, after adult age, and be as firm as before. It may heal, but it is permanently weakened.

Dr. Barker. There is no analogy between the elongation of a tooth and the dislocation of a joint. I grant that the latter may be injurious to surrounding structures, but I must say that I am unable to see why we cannot correct irregularities as well at one age as at another. The consolidation of structure perhaps causes greater difficulty after adult age.

Dr. Geo. T. Moffatt, of Boston. I have had but two cases of this kind, both of which I treated mechanically. They were both cases of fracture of the central incisor. The first case was treated by carving a porcelain tip to fit the face of the fractured tooth exactly, backing that with gold, putting in two gold wires, upon which a thread was cut as far as it entered the dentine. These were inserted vertically in the tooth near the proximate corners, so as to clear the pulp, leaving them to extend down through two holes, which were made with gold-tubing and soldered to the backing of this porcelain tip. After filling in the spaces with gold and solder to shape this gold backing to the contour of the palatal surface of the tooth, *one* of these sockets was filed out to an oblong shape, and, after the tip was placed upon these smooth wires, was filled in with gold foil, that held the tip securely in place. That has been in use about seven years. The other case was a fractured central incisor, where the tip was carved so as to fit the fractured tooth, and in this tip was made a socket of an oblong shape. Then two gold screws were inserted in the natural tooth, upon either side of the pulp, and pretruding so as to enter the socket of the tip, which was filled with oxychloride of zinc, and carried into place, a perfect joint having been made previous to the insertion of the screws. That has been in use, I think, some four years. The color is excellent, and at a short distance from the patient no one would detect any evidence of the joint. These are very simple methods of treatment, and in such cases I think I should prefer this course to that presented by Dr. Barker.

Dr. W. W. Sheffield, of New London. I have had two or three cases like these,—a number where the pulp was devitalized. In that case I use but one pivot. I had one case where an incisor was fractured by a blow, which broke away a portion of its labial surface and exposed the dentine for quite a distance upon the palatal face of the tooth. I cut away all the ragged portions, and covered the palatal surface to the outer plate of enamel with gold. Then I carved a piece of porcelain as Dr. Moffatt has described, backing it firmly, and soldered on to the backing two split pivots of spring-gold. Then making holes up into the tooth, I made a square tube of platinum—delicate and small—which would just fit those split pivots. After the joint was ground, and everything prepared to fit perfectly, I filled these cavities about half full of oxychloride of zinc, and, fitting the tubes on to the split pivots, passed it up to place. The holes in the tooth were large enough to move it forward or backward, as was necessary to make it come to an exact joint on the face. After holding it a few minutes I removed it, leaving the tubes up in these openings. Then I filled around them firmly and solidly with gold, so that, whether it leaks or don't leak, there is no portion of the tooth exposed, except just the outer plate of enamel; and when it is carried to place there is hardly a line to be seen. After it is thus fitted, I open the split pivots a third of the way down and insert a little piece of whalebone; then filing the end a little beveling, I carry the thing firmly up to place. Should it become loose, it is easy to open the split pivots and set it again.

Dr. W. H. Dwinelle. I want to take issue with Dr. Barker in reference to his view of the action of forces. I believe he makes this assertion,—that a continual hammering upon anything—gold, steel, or diamond—will result in its disintegration. I think he is mistaken in that statement, especially when he makes it apply to the teeth. I know instances where there has been a continual hammering upon gold-tipped teeth for a great many years without producing any material effect whatever. I think I can show, not only in my own practice but in the practice of others in this city, teeth which have been built up substantially with gold, which have stood firmly for many years. I have in my own mouth fillings which were built up many years ago, upon which I have hammered the best I knew how without materially affecting them. It is well known that the only way we can make pure gold hard is by hammering it, or rolling it into plates, or by drawing it into wire. I have in my mind's eye, now, teeth built up with gold where the continual occlusion of the tooth in mastication has tended only to consolidate the gold, rather than to disintegrate it.

A word in reference to the methods which have been described upon the blackboard. Without any vanity, I think I may say that several of the operations there described were substantially set forth in a little treatise, which I wrote in 1855, on crystal gold. I am forcibly reminded, by several of the cases here described, of similar cases which I described in that work. There is one term which has been used in the discussion of these operations which I must take exception to, on the ground that what has once been given to the profession belongs to it, and no subsequent patronage of it entitles any individual to it. I refer to the use of the term Mack's screws. These screws, at the time of their introduction, many years ago, were given freely to the profession,—without money and without price,—and were used for a long time under various names. They belonged to the profession for eighteen or twenty years, when they were patented and dubbed Mack's screws. I rebuke the thing, and ignore the designation. The genius of patentism is abroad, and of its oppressive operation upon us as a profession we are sorrowfully reminded by the judicial decision which has been rendered against us within the past twenty-four hours.

A word in regard to the treatment of teeth which have been broken off. I have occasionally adopted the expedients which have been suggested here to-night quite successfully, but I think the process of elongating teeth is eminently proper and practicable, especially among young persons. I believe with Prof. Barker, however, that there is no limitation as to the time when teeth are susceptible of regulation. It takes a longer time to perform such operations in the adult than in the child, but the same result may be reached in each case. I have known teeth to be elongated in persons thirty or thirty-five years of age, in one case where the patient was at least forty years of age. I had one case where the four inferior bicuspids did not erupt, never would have erupted, and the consequence was deformity of the jaw. There was no way to correct the trouble except by elongating these bicuspids, and the only practical method of doing that was to lift them up, which if left to nature would never have been accomplished. By a fixture, which I adjusted so as to operate upon them gradually, they were literally lifted up bodily the whole length of the crown or nearly so. As they were raised up out of their sockets there was a deposit of osteo-plasma formed beneath them, so that they were kept firmly in their places. They are now perfectly firm and solid. Such an operation as this is more difficult in adult age, but it is always practicable.

Dr. Geo. T. Barker, of Philadelphia. The doctor puts me somewhat in a false position, yet I do not object to criticism, and nothing pleases me better than to defend statements that I make.

The position I took was this: that a force exerted in a certain direction, constantly operating and acting upon a given point, produces disintegration. In the operations spoken of by the two speakers preceding Dr. Dwinelle, the force of the food between the inferior and superior incisors was being continually exerted so as to force off the artificial tip. If I were to guide a tip of porcelain as carefully as I could, how long do you suppose it would stay if I were to attempt to hold it there with oxychloride? It would not stay for any length of time. What, then, is the object of the oxychloride? To make a tight joint. If we have a gold screw, or a single piece of gold, holding that tip in position, all the force exerted on this tip in every direction is a strain upon that gold screw, and that piece of gold will disintegrate under it. If you have strength enough to withstand this constantly operating force, why then it will stand.

Dr. W. H. Dwinelle. In regard to the matter of disintegrating a metal by repeated blows upon it. If they are applied in an oblique or skiving direction upon a tip, in the course of time it will yield, but in case of teeth built up square and solid, I think every time there is a straight, direct blow upon that gold, it is only confirmed in its solidity. There are instances where there is a backward force exerted in mastication, but if there is a good, firm anchorage there will be no trouble resulting.

Dr. John B. Rich, of New York, then read the following paper, entitled "On the Use of Coffer-Dams as an Aid in filling some Classes of Cavities in the Teeth:"

Mr. President and Gentlemen:—From the first year of my practice to the present time I have used the coffer-dam on certain occasions, and it has proved so valuable an auxiliary to me that I have thought a description of my mode of using it might possibly be interesting, and perhaps afford some hints to others.

With the construction and use of coffer-dams, as they are generally used in engineering, I had become practically familiar while engaged in the practice of the profession of an engineer.

In 1836, the first year of my practice, a gentleman became my patient who had in his mouth a tooth that was badly decayed, but had never given him any pain. He had already consulted several eminent dentists in relation to it, and they had all told him it could not be filled. It was indeed a desperate-looking case. He was anxious to preserve it, if possible, on any terms, except having it filled with amalgam, which he would not have in his mouth. Upon a careful examination, I found that the decay had not reached the pulp-cavity.

The tooth was the right inferior second molar, with a large cavity in the grinding surface involving nearly the whole of the crown, and extending from one proximate side to the other. The third molar had been extracted, but the first molar and all the rest of the teeth on that side were in their places. The whole of the right proximate wall of the cavity was gone, and a large portion of the left. The decayed portions were dark brown in color, and in some places almost black, but underneath the decay the bone was very hard. I removed the ragged edges of the margin of the cavity, and formed it into shape; and when I had done the best I could, and it was prepared for filling, it had but two walls, the lingual and labial. The lower margin of the cavity on the right proximate side was below the surface of the gum, and on the side next to the first molar the lower margin was on a level with the gum, and the cavity presented the appearance of a deep groove plowed through the longest diameter of the crown. After I had prepared the cavity I did not know how it was to be filled. It was certainly the most difficult case I had then met with. There was no rubber dam in those days; no adhesive gold. What was I to do with this bothersome cavity? I did not give my patient much encouragement about it, but filled the cavity with a preparation of mastic and cotton, which I used for such purposes, for we had no gutta-percha then, and left it until the next day. The patient came. I examined the tooth again. Almost at the first glance the idea of a coffer-dam occurred to me, and in a moment the feasibility of using such an appliance as an aid to fill a cavity in a tooth became clear to my mind, and I will now endeavor to describe the apparatus that was developed from this suggestion, and the mode of applying it, taking the cavity just described as an example.

It took several days to fully develop this idea into a practical apparatus, but this was done at last, and I took an impression of the side of the lower jaw where the tooth was located, made a metal model from it, and by means of this model constructed of gold plate a band that would clasp the whole circumference of the tooth to be filled, from the grinding surface down to and below the lower margin of the cavity. The band was cut long enough, so that, after allowing the proper length for the circumference of the tooth, there would be a surplus on each end of about one-eighth of an inch. The band was then formed as near as was deemed necessary to the shape of the tooth, and the surplus on each end was bent or doubled back on the outside so as to form a loop, the bend being on a line with the perpendicular axis of the tooth. When the ends of the band were brought together, the points where this band was thus bent, and which had by this bending process become the ends of this open, broad ring, were accurately fitted with a file, so that the filed surfaces when placed in contact would form a close joint. To fasten these looped ends together there was constructed of gold plate a flat-forked key with two prongs, which were fitted into the two loops which had been formed on the ends of the band when the surplus length was folded back on the outside. And upon placing a piece of rubber, or any other good packing, between the close-fitting ends, and inserting the key in the loops, the band became a strong closed ring, and the joint thus made a perfectly tight one. This band was constructed of such size that when the ends were fastened together, and it was placed around the tooth, it would not fit tight to it, but at the point near its lower edge, where it surrounded the tooth, at the line of the lower margin of the cavity, and for the distance below the margin that it might extend, there would be a space between the tooth and the band of about the fiftieth of an inch in width, and above that point, up to the top of the band, the space would be about double that width.

The use to be made of this space will be apparent as the description proceeds. The lower edge of this band, that would come in contact with the gum, was formed like the edge of a carpenter's chisel, with the bevel on the outside, so as to facilitate its insertion between the tooth and the gum. If in placing the lower edge of the band below the margin of the cavity it should impinge upon the gum so as to produce pain, a slight touch of the lancet at the point impinged upon would remedy that difficulty.

Having described how this band was constructed, I will now explain how it was applied to the particular case already stated, and converted into a coffer-dam.

The space required between the first and second molars for the adjustment of this appliance had been obtained by forcing cotton floss between them; the band was placed in the position around the tooth where it was to be used, with its lower edge about four-fiftieths of an inch below the lowest point of the margin of the cavity; the ends were brought together on the outside or labial surface of the tooth, a piece of rubber was placed between them, the key was inserted, and the closed joint was formed.

Some small wedges of sandal-wood were then inserted between the tooth and the band to keep it temporarily in place; these wedges were inserted in such manner that the space between the band and the tooth would be of the same width on all sides; tin foil was then carefully packed in this space with a thin instrument.

There was no attempt made to keep this foil dry while it was being packed. but it was made quite hard in this narrow fissure, and in doing that the moisture was all pressed out of it. The packing was first carried around the whole of the inside circumference of the band below and up to the lower margin of the cavity; it was then extended over the whole of the remaining external surface of the crown up to the top of the band, barely leaving the margins of the cavity free.

The small wedges were removed one by one as the packing reached them, and in this way the band was made to fit close and immovable to the tooth, and the space between them made moisture-proof. When the packing inside of the band had been completed, a sufficient quantity of tin foil was packed between the outside of the band and the first molar, to maintain the space between the two teeth that had been previously made by the cotton floss, so that the band could be easily removed when the cavity in the tooth had been filled. When that packing was completed I had surrounded the crown of that tooth with a moisture-tight coffer-dam, and the cavity to be filled had four strong walls.

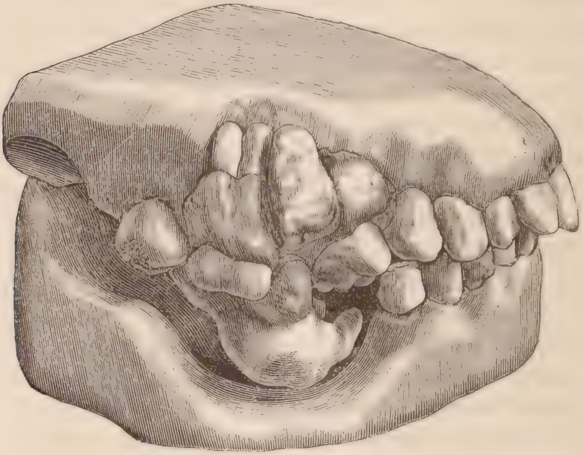
After many experiments this mode of packing was found to be the only way by which the coffer-dam could be securely and immovably fastened to the tooth, and at the same time have the pressure equally distributed over the whole surface of what was left of the crown, and thereby avoid the danger of crushing some part of the walls. If the coffer-dam was set up tight around the tooth, with a screw or any other device, no matter how accurately the band may have been fitted, it would be impossible to know that the pressure was distributed: it is probable that it would be greatest at some one point, and that might be where the wall was the weakest and least able to bear such pressure. By the arrangement of this apparatus the filling of that cavity became a very simple matter; the gold could be packed in any direction, and upon the extreme lower edge of the margin that was below the surface of the gum it could be made as solid as at any other point. When the packing of the filling was finished the tin foil that had been packed between the outside of the coffer-dam and the first molar was taken away, the key was lifted out of the loops, and the band removed; the filling was then finished the same as any other would be. This sort of coffer-dam can be applied in the same way, and with great advantage, to cavities with three walls, where any part of the margin is below the gum, or where there are but two walls standing at an angle with each other, as they would be if one was the lingual and the other either of the proximate walls, or it may be successfully used where there is but one of the sides of the crown left. If it should not be desirable to have the band pressed down below the gum the same distance all round the tooth, its lower edge can be formed of such shape that it will only dip down below the edge of the gum at the points where it may be needed, while the rest of the edge will remain at any height desired. It can also be used with great advantage for filling cavities with amalgam where any of the walls are destroyed; then that portion of the band that would come in contact with the amalgam should, previous to the insertion of that substance, be coated with gutta-percha dissolved in chloroform; if the gutta-percha is pure, this coating will be very strong, will dry in a few minutes, and will prevent the free mercury in the amalgam from acting upon the metal of the band. The band for these coffer-dams can be made of gold, silver, or brass (silver- or nickel-plated), or a brass one might be simply tinned. I have often left one of these coffer-dams around a tooth in the mouth for several days at a time without its being disturbed in the least. Within the last two years I have sometimes used amalgam as a packing for these coffer-dams instead of tin foil, where the cavity was to be filled with amalgam, and have been much pleased with its use. It can be very readily and expeditiously applied, and with much less labor than the foil-packing which I have already described. When amalgam is to be used as a packing, the metal band is prepared for it, previous to its being placed around the tooth, by coating its inside surface with a thin film of the gutta-percha dissolved in chloroform, already described; the amalgam intended for the packing is then mixed in the proportions of equal parts of mercury and alloy filings, which will make it of about the right consistency for this purpose; it is to be worked down in the space between the band and the tooth with a thin instrument, in the same manner that the tin foil was packed, until the space between the lower edge of the band and the lower margin of the cavity is filled; when this has been done an additional quantity of the alloy filings is to be mixed with and worked into this pasty mass until there is sufficient added to cause the amalgam to set hard. The remaining space between the external surface of the tooth and the coffer-dam is then filled with amalgam of the consistency of which fillings are usually made; for this purpose it is better to select one of the alloys that will set quick.

Yet more recently I have made some experiments with this amalgam packing for coffer-dams where I wished to fill the cavity with gold, and with very satisfactory results. The only variation made, where gold is to be used, is that the amalgam packing, after having set, is trimmed so as to be entirely out of the way of contact with the gold at the points where pressure would be applied to the latter; all of the exposed parts of the amalgam packing are then to be coated with a varnish made of equal parts of a solution of gum copal in ether and gutta-percha dissolved in chloroform; this varnish dries in a few minutes, and will effectually prevent the amalgamation of any free mercury that may be in the packing with the gold of the filling. I have used coffer-dams made of hard rubber and celluloid, but I do not like them as well as those made of metal; they are not so easily adjusted, and in most cases take a long time to fit.

Dr. E. F. Barnes. Last December a gentleman of fifty-seven years of age called upon me for advice and treatment concerning a tumor (fungous growth), which had extended down between the first and second right superior molars to about the size of a hickory-nut, separating the molars about one-fourth of an inch. (The tumor, in alcohol, and the model were then exhibited. See Fig. 2.)

Some two years ago a small elongated growth of the gum extended down to about the size of a pea, but being constricted at the gum soon came away of itself. Then commenced the larger growth. During the last six months it increased very rapidly, nearly one-half its present size. There was no particular soreness or sensitiveness, the tumor being very vascular, and bleeding at the slightest touch. It was easily moved by the tongue and cheek, which was necessary to the closing of the mouth. The teeth and gums were all badly affected with salivary calculus,—the cause, in my judgment, of the abnormal growth.

Fig. 2.



The first and second molars, immediately in contact with the tumor. I deemed advisable to extract, they having no antagonists, and the second molar being entirely devoid of alveolar process and gums over the buccal roots, caused by the large deposit of salivary calculus.

In extracting the second molar, as I anticipated, the tumor was so firmly attached to the roots that the whole mass—tooth and tumor—was brought away together, and only required separating from the gum at the palatal surface.

There was very little hemorrhage, and no especial treatment seemed to be required other than in ordinary cases of extraction.

By removing the salivary deposits about the remaining teeth, and cleansing thoroughly, the gums have been restored to a healthy condition.

Dr. Frank Abbott. I have a very interesting case under treatment. It is a child about two and a half years of age. On the left side of the lower jaw it has a very severe abscess, discharging through the cheek upon the lower part of that side of the face, and another equally as bad on the right side of the upper jaw, which, I judge from the examination I have been able to make thus far, opens into the antrum of Highmore. I have extracted the tooth which was supposed to be the offender upon the lower jaw, and intend in a few days to remove the one from the upper. The point of particular interest in the case, to me at least, is contained in its history, which is as follows: During the winter of 1875–76 this child was first attacked with whooping-cough, and by the time the disease was fairly seated, and nicely at work, she caught the measles, and before she recovered from this attack, inflammation of the lungs, through severe coughing and the low physical condition of the child, was developed. Under the combined effects of these several diseases the condition of the child became very precarious indeed. As she convalesced her mother noticed that the face on either side was slowly swelling, and every day she could see it increasing until the little one was not recognizable by any of her friends. After some months the mother discovered a discharge of pus from around the neck of the lower molar, but no such discovery was made in the upper jaw until I saw her. I first saw the child about the 25th of October. After a careful examination of the case my diagnosis was that undeveloped roots of the second molar teeth in each locality were the cause, and that the cessation of development in the roots was due to the protracted enfeebled condition of the child during the previous winter. I should be pleased to have any of the gentlemen present examine the tooth, which I have, whenever they can make it convenient to call at my office, as my diagnosis in the case proved to be correct. Such cases, I think, are very rare, and extremely interesting to pathological students.

Dr. C. A. Kingsbury, of Philadelphia. I do not know that I shall be able to offer anything which is new to you, but I have recently had a case in my practice which was quite new to me. Some weeks ago a lady, of about forty years of age, called upon me, complaining of an abnormal growth on the lower jaw. She had had a set of teeth inserted seventeen years previously, and had worn them constantly until within a few months. Upon examining her mouth I found it presented a very marked case of hypertrophy of the mucous membrane, commencing with the interior border of the jaw and extending in the form of a flap or apron over the entire border of the jaw, not only completely covering the superior border, but extending over into the mouth and resting on the filaments of the tongue. The lady was desirous of having an artificial denture substituted in place of the one she had worn so many years, but I found the mouth presented very serious obstacles to the wearing of a set of teeth. The case was such a remarkable one that I requested a consultation. The operation of inserting an artificial denture would necessitate the removal of this hypertrophied tissue covering the jaw, so I accordingly made another appointment with her, and in the mean time called upon Dr. Agnew, of Philadelphia, and requested him to meet the patient at my office the next day, which he did. He said that it was a remarkable case of hypertrophy of the mucous membrane,—that he had never seen anything like it in his practice. We agreed upon the necessity of the removal of the hypertrophied portion, and I requested him, as he was present, to perform the operation. He did so, simply making an incision separating the flap or apron at the median line, and with a pair of surgeon's scissors removed the hypertrophied part on each side. I preserved the parts removed and took notes of the case, intending to make a report of it through the journals, but I have failed to do so, this being the first public mention of it. This hypertrophy was undoubtedly produced by a great absorption of the alveolar process; the outer edge of the plate, resting upon the integuments or loose mucous membrane connecting the interior border of the jaw with the buccal tissue, had kept up a continuous state of inflammation, causing absorption. Immediately on the operation being performed I took an impression of the lower jaw, and inserted in the course of a few days an artificial denture, upon celluloid, which has been worn ever since without complaint.

Dr. G. T. Barker. I do not desire to find fault with my neighbors, but I must take decided exception to Dr. Kingsbury's course in this case. I assert that the course which he pursued in not performing this operation himself has had a direct tendency to lower the tone of our profession. If we are ever to hold a position among medical men, we must have more professional self-reliance, and possess the skill and courage necessary to perform any operation which comes within the legitimate scope of our calling in a better manner than any one outside of our specialty.

Dr. C. A. Kingsbury. The lady of whom I speak expressed her entire confidence in my skill and ability to perform this operation; but, as it was such a singular case, I considered it advisable to call in a gentleman who is known to be a man of eminent skill and experience in surgery, and whose judgment in the case I thought would be valuable.

Dr. J. S. Latimer. I would like to relate a case somewhat similar to the one reported by Dr. Kingsbury. A clergyman came under my notice in 1862 who had folds at the sides of his mouth, and a single fold extending around the front of the mouth the thickness of my finger,—probably half an inch in thickness,—caused by a poorly-constructed gold plate. As this gentleman required the use of his voice nearly every day, it troubled me to know how to remedy the difficulty. I took an impression of the mouth, and made a plate with a large air-chamber for greater security, without having it extend over the alveolar ridge. I then treated the hypertrophied portion with concentrated tincture of iodine, giving him a brush so that he could use it himself. In that way the folds were thoroughly and completely removed without a surgical operation, and in three weeks I had another plate made, extending over the alveolar ridge in the usual manner.

Dr. T. C. Stellwagen, of Philadelphia. Some time ago I had a similar case to the one that Dr. Kingsbury described, only not quite so extensive. It was caused by a silver plate, which the patient wore to support a few molar teeth in the lower jaw, becoming eroded from the action of acids until it was roughened and almost like a saw. The result of this constant irritation was hypertrophy, which continued until it nearly overlapped the alveolar process. I had some difficulty in taking an impression for a denture, which I made on gold, and the hypertrophy was cured without a surgical operation and without the use of tincture of iodine. In other words, having removed the irritation, the hypertrophy got well of its own accord.

(To be continued.)

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PENNSYLVANIA ASSOCIATION OF DENTAL SURGEONS.

REPORTED BY THEODORE F. CHUPEIN, D.D.S.

The annual meeting of this association was held on the evening of October 9th, 1877, at the hall of the Pennsylvania College of Dental Surgery. The following were elected officers for the ensuing year:

President.—Robt. Huey, re-elected.
Vice-President.—E. R. Pettit, re-elected.
Recording Secretary.—Jos. Pettit, re-elected.
Corresponding Secretary.—Theodore F. Chupein, elected.

Treasurer.—E. H. Neall, re-elected.

Librarian.—W. H. Trueman, re-elected.

Reporter.—Theodore F. Chupein, re-elected.

Committee on Membership.—Drs. Buckingham, Spencer Roberts, and C. N. Peirce.

Dr. C. N. Peirce spoke on the subject of symmetrical diseases. He said pathologists attributed symmetrical diseases to a condition of the blood, and therefore classed them among blood diseases. By symmetrical diseases was understood that if a member or organ of one side was affected, the similar organ or member of the other side would likewise be affected. From this circumstance he had been led to give some thought to the subject in its probable relation to the teeth. We frequently, almost invariably, find that if one tooth was affected at a certain point on one side of the jaw, the corresponding tooth of the opposite side was almost sure to be similarly affected to a greater or lesser extent at or about the same point.

Dr. Buckingham believed symmetrical disease would be more likely to affect the teeth during the process of development, and the imperfections found in one tooth most likely to be found in the corresponding tooth of the opposite side, since they were developed in pairs. Decay of the teeth is generally recognized as commencing externally, and caused by external irritants. To attribute decay to symmetrical diseases, inter-dentinal circulation would have to be proven.

Dr. Peirce said that imperfectly formed teeth could be traced as well to repeated convulsions during first dentition, affecting the permanent teeth then in the process of development, as it could be to the eruptive fevers or to whooping-cough. In children under his care he had noticed the effect of imperfect development when he knew that nutrition had not been normally interrupted for a longer period than a week or ten days.

Dr. Guilford said that he thought the theory that the condition of the blood affected teeth symmetrically, was one that should be carefully investigated. No doubt the condition of the blood at the time of their development had much to do with symmetrical disease of the teeth, and yet local conditions after eruption had also much to do with it, because uncleanliness or want of proper attention to the teeth at any age would certainly similarly affect all the teeth erupted at that age,—all other conditions being equal. To show still more fully how after-conditions were perhaps more instrumental than the condition of the blood in producing symmetrical disease, he mentioned that we frequently found one tooth in normal position affected by decay in a certain way, while its fellow on the opposite side, standing alone, or, at least, not in close contact with its neighbors, was not so affected. Local conditions in such cases were mostly responsible for the difference.

Dr. A. Wert rather inclined to the belief that to the lack of cleanliness, and not to any condition of the blood, could be traced the symmetrical diseases which we meet with.

Dr. J. W. Adams related a case of absorption of the roots of the second superior permanent molar caused by the wisdom-tooth making its way downward between the roots of this tooth and causing it to loosen, as in the case of a temporary tooth loosening by the advance of its permanent successor.

Dr. Buckingham said that the teeth suffered when a person was sick, and thought there was much to be looked into in the remarks of Dr. Peirce; he would unite with all the gentlemen present in requesting Dr. Peirce to lay his thoughts on this subject before the association, in the form of an essay.

Dr. Pettit asked Dr. Peirce if he found the teeth differently affected from the various exanthemas?

Dr. Peirce said the difference in appearance of the markings was due more to the difference in the severity and duration of the disease than to the variation in kind.

Dr. Guilford related a case in office practice. An upper molar, previously filled, had by some accident been split so that the anterior buccal root with its portion of crown had become entirely separated from the other portion. This he filled with amalgam, making the filling bind the broken pieces together. This lasted a year, when the patient returned, and it was found that the tooth had again split, this time each root being separate and movable.

After an examination of the case for five minutes, finding each root loosened by the force of the bite, which severed the roots from each other, he pronounced it incurable. A remark from the patient as to the limited ability of dental art put him on his mettle, and he resolved to attempt the salvation of the tooth. Nothing remained of the crown but three jagged points of enamel and dentine projecting from each root. These he cut off half-way to the gum, and beveled off outwardly with a corundum-wheel. With a thin piece of platinum he formed a clasp or ring as great in width as the original height of the crown, which, being soldered and slipped over the projections, bound them together. This ring of platinum was then filled with amalgam and built up until the amalgam antagonized with the opposing tooth, when the case was dismissed for a week. At the end of that time the platinum band was cut off by a circular-saw on the dental engine and the surplus material smoothed off, and the tooth to all appearances seems likely to be of service for a long time.

Adjourned.

NEW HAMPSHIRE DENTISTS.

The New Hampshire Dental Society, which was chartered at the last session of the legislature, organized at Nashua, November 2d.

The following officers were elected for the ensuing year:

President.—Dr. D. W. Edgerly, Farmington.

Vice-President.—Dr. H. Hill, Manchester.

Secretary.— Dr. C. W. Clement, Manchester.

Treasurer.—Dr. G. F. Booth, Concord.

Librarian.—Dr. G. A. Young, Concord.

Board of Censors.—Drs. Cummings, Little, Jarvis, Clement, and Edgerly.

Council.—Drs. Young, Hill, and Murphy.

Committee on Operative Dentistry.—Drs. Young, Clement, Jarvis, and Edgerly.

The object of the society is to collect facts and disseminate knowledge in the interest of the profession. The society starts under very favorable circumstances. It is believed it will be of great service to the profession throughout the State.

C. W. Clement, *Secretary.*

MERRIMACK VALLEY DENTAL ASSOCIATION.

At the fifteenth annual session of the Merrimack Valley Dental Association, held at Nashua, New Hampshire, November 1st and 2d, 1877, the following officers were elected for the ensuing year:

President.—Dr. C. G. Davis, of New Bedford, Mass.

First Vice-President.—Dr. I. J. Wetherbee, of Boston, Mass.

Second Vice-President.—Dr. T. H. Chandler, of Boston, Mass.

Recording Secretary.—Dr. W. E. Riggs, of Lawrence, Mass.

Corresponding Secretary.—Dr. D. W. Edgerly, of Farmington, N. H.

Librarian.—Dr. G. F. Waters, of Boston, Mass.

Executive Committee.—Dr. R. R. Andrews, Dr. J. H. French, Dr. G. A. Young, Dr. A. W. Howland, Dr. T. Haley.

The semi-annual meeting will be held at Boston, Massachusetts, on the third Thursday of May next, 1878.

W. E. Riggs, *Recording Secretary.*

CENTRAL PENNSYLVANIA DENTAL ASSOCIATION.

A stated meeting of the above association will be held in the City Hall, Tyrone, Pennsylvania, on Wednesday, January 16th. Members of the profession are invited to attend.

John S. McKiernan, *Secretary.*

CLINICAL REPORTS.

PENNSYLVANIA COLLEGE OF DENTAL SURGERY.

CASE OF ACQUIRED CLEFT PALATE,—SERVICE OF PROF. J. EWING MEARS, M.D.

REPORTED BY EDWARD C. KIRK, STUDENT.

THE following interesting case presented itself at the surgical clinic of Professor Mears, at the Pennsylvania College of Dental Surgery. James B., aged fifty-eight years, a native of Edinburgh, Scotland, parents both dead; their children were all perfectly healthy, as are also the children and grandchildren of the patient. When between the ages of ten and eleven years, after violent exercise on a warm day, he took a sea-bath while greatly overheated; the result of this imprudence was an inflammation and stiffness of the knee-joints, for which he was sent to a hospital and received appropriate treatment. While in the hospital a nurse gave him by mistake a powder which he believed to have been calomel intended for another patient. The day after he took the powder he was attacked with a severe pharyngitis, which he attributes to being exposed to a draft from an open door near his bed while under the influence of the mercurial. After leaving the hospital he found himself unable to breathe through his nose until between three and four weeks subsequently, when, during a paroxysm of coughing, he felt the air rush up through his nose; since then he has labored under the difficulties of articulation and deglutition for which he now seeks relief. Upon examination it was found that the inferior border of the soft palate was adherent throughout its entire length to the posterior wall of the pharynx, and that there was a longitudinal fissure-like opening from before backwards, about three-fourths of an inch in length and one-fourth of an inch in breadth. It was evident, from the history of the case, that the violent inflammation which the parts had undergone was the cause of the adhesion between the soft palate and the posterior wall of the pharynx, this being favored by the recumbent position maintained by the patient while undergoing treatment for the knee-joint trouble, and that the longitudinal opening was made by the paroxysm of coughing while the parts were still in a tender and inflamed condition. The conditions for an operation not being favorable at present, it was postponed until a more suitable time.

The steps of the operation in this case, however, would be simply to dissect off the soft palate from the walls of the pharynx, and then to freshen the edges of the fissure and bring them together by means of sutures.

It was the opinion of Professor Mears that, in cases like the present one of acquired cleft palate, there was more reason to hope for success from an operation as far as deglutition was concerned, if not articulation, on account of there being sufficient tissue to form a useful palate, which is seldom the case in congenital fissure.

EDITORIAL.

TO SUBSCRIBERS AND CORRESPONDENTS.

In order to reduce the large accumulation of matter on hand awaiting publication, we have added sixteen pages to this issue of the Dental Cosmos. Even with this addition a considerable amount of matter for the Periscope and Hints and Queries departments, already in type, is necessarily laid over for another number. This statement will be a sufficient explanation to contributors whose articles have not yet appeared.

CORRECTION.

In the report of the American Dental Association published in the December (1877) number of the Dental Cosmos, the types made Dr. Essig speak of Rauch's test, instead of Reinsch's.

PERSONAL.

Drs. Bogue, of New York; Moffatt, of Boston; Cook, of Brooklyn; and Daboll, of Buffalo, announce the opening of a dental office at No. 39 Boulevard Haussmann, Paris, France.

BIBLIOGRAPHICAL.

A Dictionary of Medical Terminology, Dental Surgery, and the Collateral Sciences. By Chapin A. Harris, M.D., D.D.S., Professor of the Principles of Dental Surgery in the Baltimore College, etc. Fourth edition, carefully revised, and enlarged. By Ferdinand J. S. Gorgas, M.D., D.D.S., Professor of Dental Surgery in the Baltimore College of Dental Surgery. Philadelphia: Lindsay & Blakiston, 1878.

Some ten years having elapsed since the publication of the previous edition of this dictionary, a revision of it was very much needed.

Never in any previous decade has there been such a thorough revolution in the theory and practice of dentistry, and, in consequence, there was a vast deal of matter which had become obsolete, and many new processes, terms, and appliances, which needed to be described; many new articles of the Materia Medica employed in the practice of dentistry, and dental uses of older ones to be noticed. The reviser claims that he has made an earnest effort to bring the book up to the present requirements of the profession, and in order to accomplish this object the medical portion has been as carefully revised and added to as that more especially devoted to Dental Science.

Many of the dental articles are presented in a sort of essay style which is more like that of an encyclopædia than of a dictionary, but this fullness of treatment makes the volume all the more useful, especially to students. Of course, no dental library will be considered complete without a copy of the latest edition of Harris's Dictionary.

MODERN SURGICAL THERAPEUTICS.—A COMPENDIUM OF CURRENT FORMULÆ, APPROVED DRESSINGS, AND SPECIFIC METHODS FOR THE TREATMENT OF SURGICAL DISEASES AND INJURIES. By GEORGE H. NAPHEYS, A.M., M.D., etc. Revised to the most recent date. 1 vol. 8vo. 600 pages. Cloth, $4.00; leather, $5.00. Philadelphia: D. G. Brinton, 1878.

This is a companion-volume to one noticed in our February (1877) issue ("Modern Medical Therapeutics"), and which we took occasion to commend as differing from all other books of its class, and as a ready reference superior to any other. This volume holds the same relation to surgery that the former does to medicine, and is equally unique and equally systematic in its presentation of the therapeutics of surgical diseases and injuries.

In general plan and arrangement the two volumes are similar, but differ entirely as to topics. All who are familiar with the usual classification of diseases under the general description of medical and surgical, will recognize the propriety and value of the distinction made in the scope of the two volumes. And yet, without explanation, one might expect to find in the volume under consideration a description of operations and apparatus. Such, however, is not the fact. The book is devoted to that which is indicated by its title,—the *therapeutics* of surgery. The diseases and injuries are classified, and under each is given the treatment—generally the exact prescription—of several of the most eminent living authors and teachers, followed by a *résumé* of the drugs which are considered as efficient remedies in the special derangement under consideration. Over seven hundred different authors are named and quoted, representing the United States, Great Britain, France, and Germany. Hardly a surgical author of any eminence has been omitted. Nearly one thousand formulæ are quoted, representing the most approved and the most recent combinations of the best surgical authorities.

The book is divided into seventeen chapters, with approximately two hundred subdivisions, giving a careful summary of the resources of therapeutic art in the treatment of the various idiopathic and traumatic lesions thus classified. As in the previous volume to which reference has been made, a full index of diseases, remedies, and authors (three elaborate indexes) facilitates reference to each, and enables the reader to find without trouble the information he seeks, whether from the direction of pathology, therapeutics, or authority.

The book is handsomely printed on excellent paper, and is well bound. It will be a valuable addition to any medical library. The two volumes might almost be said to constitute a medical library in themselves. The value of the companion-volume has been greatly enhanced in the most recent edition by the addition of a chapter on Toxic Diseases, including the very important subject of Alcoholism, Acute and Chronic, and the Opium Habit.

MATERIA MEDICA FOR THE USE OF STUDENTS. By JOHN B. BIDDLE, M.D., Professor of Materia Medica and General Therapeutics in the Jefferson Medical College, etc. Eighth edition, revised and enlarged, with numerous illustrations. Philadelphia: Lindsay & Blakiston, 1878.

This book is so well known that any review of it is unnecessary. It is a compact statement of the sources of supply, botanical and physical characteristics, medical properties, toxic effects, and therapeutic uses of all the articles of the Materia Medica in general use in the United States. The exhaustion of the previous edition within a year of its issue is evidence of the estimation in which it is held as a text-book. This edition seems to have been very carefully revised. Many new articles have been added, and the progress of pharmacological science has been availed of throughout the volume. The illustrations comprise representations of most of the important indigenous and naturalized plants employed in medicine.

ELEMENTS OF DENTAL MATERIA MEDICA AND THERAPEUTICS; WITH PHARMACOPŒIA. By JAMES STOCKEN, L.D.S., R.C.S., Eng. Philadelphia: Lindsay & Blakiston, 1878.

The author of this little volume was deputed by the medical staff of the National Dental Hospital of London to prepare a manual for the use of the hospital. Subsequently, he was urged to extend its scope, with a view to publication, and the matter having appeared in sections in the *Monthly Review of Dental Surgery*, was revised, and now appears in book form.

The volume is appropriately entitled "Elements of Dental Materia Medica and Therapeutics," because it is an outline or sketch of what might be written upon the subject. A much fuller treatment of many of the subjects would have added largely to the value of the book. It is nevertheless a compact and convenient summary, but the omission of quotation marks where they should appear is altogether too frequent.

THE MOUTH AND ITS DISEASES; BEING A TEXT-BOOK FOR THE USE OF THE ORAL SURGEON.* By DR. ROBERT BAUME, editor of the *German Quarterly of Dental Science*, practitioner of oral surgery in Berlin. Pp. 609.

This volume, which is dedicated to the "Central Association of German Dental Surgeons," has its origin in a prize offered by that society for the best essay on the "Relation of Diseases of the Teeth to the System at Large." "Welchen Einfluss haben Krankheiten der Zähne auf den Gesammtorganismus."

As a foundation the author assumes the identity of the specialties with the mother science of general medicine, and upon such a premise writes a book, which very well bears the scrutiny of a close looking-into.

This work treats of disease rather than of the cure of disease. Operative dentistry has no place in it,—at least in the American sense,—neither is its therapy at all overburdened. As a volume treating purely of oral pathology its deserts commend it highly. The pages devoted to caries of the teeth are particularly full of interest; of these there are sixty-one, and which are appropriately followed by seventy-two devoted to diseases of the pulp,—Krankheiten der Zahnpulpe. In the second part of his work the author presents in the way of illustrations a number of very interesting dental anomalies, not, however, any of them new to readers on this side of the water, but not on that account any less instructive.

The fifth section of the book treats of diseases of the alveo-dental periosteum, and of the relation of these diseases with caries, necrosis, and kindred affections; it is a very complete *résumé* of what is commonly known on the subject.

Passing to the sixth division, we are met by an exceedingly interesting essay on diseases found associated with the jaws. This chapter comprises twenty-eight pages, and is devoted chiefly to the consideration of tumors; a subject—this last—on which the oral surgeon cannot get too much light.

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* Lehrbuch der Zahnheilkunde, von Dr. Robert Baumé, Redacteur der Deutschen Vierteljahrsschrift für Zahnheilkunde, etc. Leipzig: Verlag von Arthur Felix. 1877.

A section on "Neuroses" adds nothing to the value of the volume; it falls far short of the practical fullness with which the subject is treated in this country. It is, however, so far as it goes, able and well digested, and is to be found fault with only as it makes pretensions to the character of a chapter in a text-book.

As a work showing the higher education which is taking the place of old things in the dental world, and which must do its part in compelling a recognition of the capabilities lying in the specialty, we welcome the book warmly. With a few more authors of this same school the necessities of the relation of dental surgery with oral surgery, and consequently with the common mother profession, will be made very plain. Dr. Baume is of a class of practitioners who reflect honor on the dental specialty. We commend his book to readers of the German language interested in pathology. A. B. C.

OBITUARY.

DR. GILBERT A. FOSTER.

Died, at Utica, New York, December 7th, 1877, Dr. Gilbert A. Foster, in the seventy-fifth year of his age.

Dr. Foster was born at Litchfield, Herkimer County, New York. He began the study of dentistry in 1828. In 1832 he removed to Utica, in which place he continued to reside until his death.

His professional connections at different times were, Foster & Standish; Foster & Blakeslee; Foster, Son & Co., and finally, G. A. Foster & Son. He was one of the original members of the American Society of Dental Surgeons, organized at Baltimore in 1842. He was the first president of the Fifth District Dental Society, and was one of the American commissioners to adjudicate upon dentistry at the World's Fair in New York, in 1853.

Dr. Foster was a man of natural taste and refinement, a skillful mechanician, and an enthusiast in his profession. In social intercourse he was genial and attractive; in practice as well as in profession a Christian, without cant and without self-assertion. In Utica, where he lived for forty-five years, no man was more respected or more beloved.

PUBLISHER'S NOTICE.

THE NEW VOLUME.

THIS number commences the twentieth volume of the DENTAL COSMOS. A steadily-increasing subscription list made the circulation of the last volume much larger than that of any previous one, and. we are very confident, far beyond that of any other dental journal in this or any other country. A subscriber to it is to be found in every quarter of the globe where there is an English-speaking dentist.

This result has been reached only by persistent effort to excel; by the determination to make the DENTAL COSMOS the leading dental journal of the world. because of the most efficient service. How far we have succeeded, our unequaled circulation bears witness, and we commence the twentieth volume in the confident expectation that the subscriptions will be still farther and very much increased. We have invited high expectations in the past, and we point with laudable satisfaction to their fulfillment. The DENTAL COSMOS has tried to deserve its title; has tried to cover the dentist's world of science and practice. We shall spare no pains in the further effort to make it supply the needs of dental practitioners; but its probable value in the future may be fairly estimated by its past record.

Each issue of the DENTAL COSMOS contains at least fifty-six pages,—more reading matter than in any other dental journal published. When any variation is made, it is by the addition of extra pages. The advertising department is *never* allowed to trespass upon the rights of subscribers.

As hitherto, the DENTAL COSMOS is pledged to the dental profession to do whatever a journal may for that profession's advancement in usefulness, self-respect, and public regard, and for strengthening fraternal courtesy, justice, and co-operation among the men who have the destiny and responsibility of the profession in their hands.

The coming volume will remain under the editorial management of Dr. J. W. White; succeeding numbers will be published on the first of each month during the year. We ask for prompt renewals and subscriptions, that we may determine the size of the edition.

SAMUEL S. WHITE.

HINTS AND QUERIES.

"He that questioneth much shall learn much."—BACON.

CORRESPONDENTS desiring a reply in this department are requested to make use of *distinctive signatures or initials*, and avoid the practice of signing their communications Reader, Subscriber, etc.

CORRESPONDENTS who wish notice to be taken of their communications should authenticate them with their names. We cannot insert queries or replies except they are so accompanied. Names not necessarily for publication.

Is there any way by which one can estimate the probable durability of an oxychloride, or other cement for filling teeth, without waiting for results in actual practice?—J. H. D.

WILL some one who has had experience inform me how to bleach a tooth whose nerve has been destroyed by arsenic?—J. F. BAILEY.

WHAT is the remedy for "checking" in the use of Lukens's body for making artificial dentures?—J. H. A.

WHAT is the philosophy of talcing fillings of oxychloride of zinc?—E.

WILL some of the old and experienced members of our profession give their opinion of, or experience in, the practice of filling the early-decaying permanent teeth of children with gold? In other words, are such operations performed with the same confidence in their conserving results that similar operations are upon older patients?—REX.

IN the DENTAL COSMOS for April, 1877, a writer in the department of Hints and Queries, over the initials O. I. C., says, "One who does not know how to treat alveolar abscess ought not to call himself a dentist." It would seem from this that it ought to be the easiest thing in the world to treat an alveolar abscess, but my experience leads me to think that it is often a very difficult matter. The janitor of the Ohio Dental College was treated there for two years for an alveolar abscess, and finally had to have the tooth extracted.

Now if O. I. C. has a special treatment which makes the cure of alveolar abscess such an easy thing as is to be inferred from his remark above quoted, I, and I am sure many others, will be glad to learn of him.—G. W. I. S.

PERMIT us to say to W. B. Steere, M.D., of Dodge Centre, Minn., regarding a recent reply of ours to "Dens," that we feel as much surprise at the assertions in his article as he (Dr. Steere) appears to evince at ours.

If practice in Minnesota bears the doctor out in his assertion that it is not weight, next to perfect adaptation *of course*, which is regarded as the great desideratum in overcoming the difficulties sometimes encountered in inserting lower dentures, then all we have to say is that Minnesota is far ahead of Maryland in this respect. Whether this is owing to any difference in the formation of jaws of the people of Minnesota we are not prepared to say, but certain it is that cases will and do occur in practice here (Baltimore) which require more than a perfect fit to insure success. We did not speak dogmatically, as the doctor would seem to insinuate, but from facts based upon actual practice.

It is true that we might have been more explicit in our directions to "Dens," and directed him to *make the plate fit*, but as "brevity is the soul of wit" we simply called his attention to points on which he desired information, without going into the minutiæ of the subject which we presumed his D.D.S. fully covered. In regard to that part of the doctor's article which treats of *perfect fit vs.* "bungling work" we will say nothing, for we feel assured that a careful, intelligent reading of the article in question (to "Dens") would preclude the possibility of any such idea being intended.—F. F. DREW, D.D.S., *Baltimore, Md.*

THE

DENTAL COSMOS.

VOL. XX. PHILADELPHIA, FEBRUARY, 1878. No. 2.

ORIGINAL COMMUNICATIONS.

DENTAL PATHOLOGY AND THERAPEUTICS.

BY J. FOSTER FLAGG, D.D.S.,

FORMERLY PROFESSOR OF DENTAL PATHOLOGY AND THERAPEUTICS IN PHILADELPHIA DENTAL COLLEGE.

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(Continued from page 7.)

Form.—1st, nodular; 2d, circumscribed or apical; 3d, extended or diffused.

Nodular exostosis.—This form of dental exostosis (Diagram I.) is probably that which is most rare, and certainly is most difficult even to attempt to account for.

It will be observed that the nodules are most decidedly circumscribed, that one, or several, can exist upon the root of a tooth, and that no apparent reason can be given for the peculiar character of the deposit, or for its defined location.

DIAGRAM I.

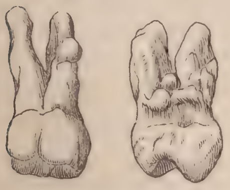
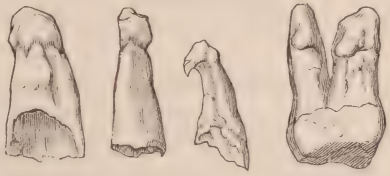


DIAGRAM II.



In this respect it is the anomalous form of this disease.

Circumscribed, or apical exostosis.—The illustrations (in Diagram II.) for this form of exostosis have been chosen not only to demonstrate its peculiarity, but as well to note the evident absence of all reasonable connection, as *cause* and *effect*, between caries of the crown and exostosis.

It will be noticed that in two of the specimens the crowns have been almost entirely lost by caries; in one it has been about half removed by the same cause, while in the fourth specimen the crown is *perfectly sound*, not having even the "*incipient gangrene*" which Mr. Bell, in his antagonism to Mr. Fox, found on "personal investigation."

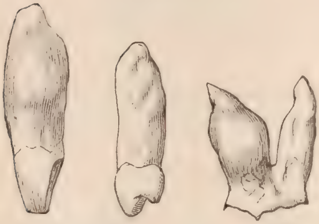
I allude to this matter, thus, as I desire to sustain Mr. Fox in his early assertion that exostosis *can* exist in connection with teeth which are *perfectly sound;* and I also desire to dissent from the implied deduction of Mr. Bell, that, as "incipient gangrene" existed in the so-called sound teeth of Mr. Fox, *to it* might reasonably be ascribed the presence of the exostosis.

If, as is the case, large numbers of teeth are found exostosed, with their crowns *largely decayed*, and also, quite frequently, are found teeth just as much, and even more extensively exostosed, while their crowns are perfectly sound, I think it a proper deduction that no *cause and effect* relation should be admitted between caries of the crown and dental exostosis.

I have nearly a dozen specimens of teeth the roots of which are largely exostosed, while the crowns are *perfectly sound.*

Extended, or diffused exostosis.—In the three illustrations of this form of exostosis (Diagram III.), the same absence of relation between crown and root condition will be observable; the first, a cuspid, having slight decay in that unusual location, upon its cusp; the second, a bicuspid, having lost nearly half its crown by caries; while the third, a molar, has lost almost the entire crown from combined caries and attrition.

DIAGRAM III.



In these specimens it will be noticed that the most extensive exostosis is found in connection with the least decay. This *diffused* exostosis gives a smooth, puffed, dropsical appearance to the entire root of the tooth. The *condition of tooth* may be, therefore, sound, slightly decayed, badly decayed, entire crown decayed away.

Age of tooth.—I do not remember ever to have seen an exostosed root which was taken from the mouth of a child; but I would not therefore say that such condition could not there exist.

The youngest patient for whom I have extracted exostosed teeth was eighteen years old, but this condition is usually found only in *adult* and *aged* teeth.

So far as my own observations have given me data as to *relative liability* of teeth to exostosis, I find that incisors and cuspids number only twenty-five per cent., while bicuspids and molars number seventy-five per cent.

Causes.—1*st.* *Mechanical.*—Any undue mechanical irritation which is possessed of frequency, if strong, or persistence, if weak, will, in due time, be liable to provoke an exostosed condition; thus the habit of gently knocking the teeth together during hours of reading, study, or business, or during moments of abstraction; the practice of breaking or cracking hard things, as nut-shells, fruit-stones, etc.; the practice of biting off threads, and the like, are often the only causes which can be assigned for existing exostosis.

Mal-occlusion of teeth is also a fruitful source of this trouble; while the working backward and forward of slightly loosened teeth and roots almost always produces tangible proof of the power of this constant, slight irritation to augment the size of the roots.

We have frequent exemplifications of this in cases of loose teeth and roots which seem easy of extraction, but which, upon the least traction, become firmly fixed in the narrowed portion of the socket, at the neck of the tooth, and are exceedingly difficult to remove.

The protrusion of fillings, so as to impinge upon and irritate the peridentium, is a mechanical liability to the induction of exostosis which should always be remembered and carefully guarded against.

This cause is the more important to note, because any *excess* in this direction will usually give rise to periodontitis, which marked irritation will demand relief; but a lesser degree of smooth finish of filling induces only that uneasiness which scarcely attracts attention, until with years of increased nutrition, at length, the pain and trouble, incident to exostosis, supervenes.

The slow deposition of tartar (hard, thin, dark, flint-like) under the free edge of the gum, when it does *less* than produce recession of the gum, absorption of the alveolar process, denudation of the root, and loosening and exfoliation of the tooth, will sometimes just so much irritate as to provoke exostosis, and thus, with equal certainty, eventually cause the loss of the organ.

2*d.* *Vital.*—The first cause which has presented itself to my notice under this head is *large metallic plugs*, especially *large root-fillings.*

In several cases where the teeth have finally been extracted for painful symptoms, which were thought to indicate exostosis, this has been found to be present.

No trouble, other than pulp-trouble, had been experienced prior to filling, but from the time of pulp-extirpation and subsequent filling, changes of temperature, incident to the use of warm and cold food, had produced unpleasant sensations.

These, which had been frequent and persistent, had, after years of irritation, gradually given place to the more aggravated symptoms of exostosis.

These cases have led to the invariable adoption of some non-conducting material as a portion, at least, of every root-filling which I now introduce,—a practice which has given such results in the direction of perfect comfort that I incline strongly to advise it.

Dental caries.—While I have positively antagonized the idea that cavities of decay situated within the *crowns* of teeth are liable to induce exostosis, I nevertheless believe that *caries* is probably one of the frequent causes of this condition.

That this shall be so is, however, dependent upon three considerations,—

1*st. Position.*—This must be under the free edge of the gum, and encroaching upon the roots.

In this position such cavities afford lodgment for food, which soon assumes the irritating character of putrescence; they also present the cavity edge and cavity depth, over which and into which the fungous-growing gum maintains a perpetual condition of hyperæmia, a condition which, by contiguity, soon imparts a like abnormal action to the peridentium.

2*d. Extent.*—It is not absolutely necessary that these irritating cavities of decay shall be very great in extent, but if they are not so, it is essential that they shall compromise vastly more cementum than dentine.

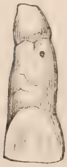
The greater the extent of caries, provided it relatively encroaches upon root-tissue, the more liable it *seems* to be to induce exostosis.

3*d. Character of decay.*—The slow variety of decay is more likely to produce exostosis than is the rapidly progressing caries. The reason for this is, evidently, that *time* is thus afforded for that long-continued, slight irritation which was shown to be required for the establishment of the disease under discussion.

Alveolar abscess.—This vital cause of exostosis, first mentioned by Mr. Tomes, has frequently been denied a place in this connection, but I have quite a number of specimens which clearly point to the correctness of his opinion.

Instances are comparatively numerous in which an abscess located upon one root of a multi-rooted tooth has so irritated surrounding tissue as to produce marked exostosis of the other roots; but the most decided cases in which this cause alone can account for the contiguous exostosis are those in which the escape of fetid gas from pulp-putrescence takes place from openings upon the sides of the roots, rather than in the usual manner from the apical foramina (Diagram IV.).

Diagram IV.



In these cases the line of exostosis is *always* immediately above the orifice, and distinctly marks the boundary between the two conditions of pyogenia and hyperæmia.

Necrosed roots.—These are not infrequently provocative of just enough irritation to induce exostosis upon contiguous vital roots, and their removal is therefore advised from mouths in which *predisposition* to this trouble has been proven by existing disease.

Exostosed teeth may themselves irritate to a sufficient degree to induce the disease in other teeth.

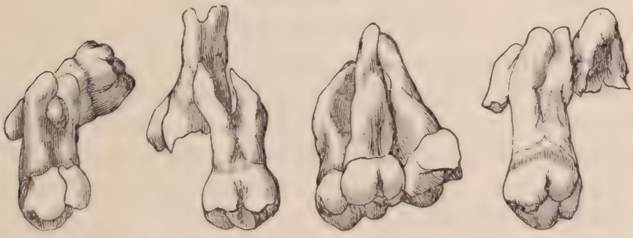
It is in this manner, either directly or indirectly, that the anomalies known as

FUSED TEETH

are produced. *These have an individual and separate pulp for each tooth.*

The illustrations (Diagram V.) will very well present to the mind the peculiarities pertaining to this condition. Sections of such teeth, which have been made for microscopic examination, present a homogeneous connecting mass of cemental tissue. With some, the ordinary causes of irritation, such as have been mentioned, have proven sufficient to produce "fusion" of adjoining teeth; but again, it will be observed that malposition of a neighboring tooth will result in such irritation from abnormal direction of growth as to "fuse" its roots with those of a properly-placed tooth.

DIAGRAM V.



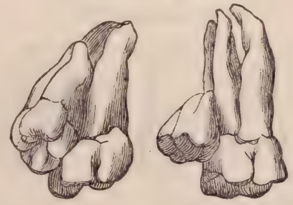
The symptoms which compel the extraction of such anomalies are those of ordinary exostosis, and I have never known or heard of a diagnosis of "fusion" having been made prior to extraction.

ATTACHED TEETH.

It seems more in place here than elsewhere that mention should be made of this intermediate condition between isolation and true fusion (Diagram VI.).

For a long period it was believed that two or more teeth, together with notable portions of maxilla, were occasionally removed in the effort to extract a painful tooth, from an osseous union existing between them and the surrounding walls of their alveoli; but it was, until very recently, always shown, by long-

DIAGRAM VI.



continued maceration and careful separation, that the union of tooth-root and surrounding bone was nothing more than an unduly strong mechanical "attachment."

Each case which presented for examination only seemed the more certainly to prove the impossibility of *union* between cementum and *true* bone, and gave so much *theoretic* proof of the *duplex* character of that alveolo-cemental membrane which, as *one*, covers the roots of the teeth and lines their alveoli, nourishing and producing cementum on one side and *true* bone on the other.

That there is a difference between cementum and bone even the latest microscopy admits, though the difference is conceded to be *very slight;* thus it will be found, as a rule, that these *unions* between teeth and jaw-bone are merely *attachments.*

It is thought, by some, that, in *exceptional instances*, idiosyncratic irritation *may* exist, which will eventuate in *positive osseous union* of cementum and surrounding bone-tissue. I must, however, state decidedly that in the closest specimens of "attachment" which I have ever examined, in some of which even "osseous union" could scarcely be a stronger bond, there has, nevertheless, *always remained* a precise line of demarkation separating the roots of the teeth from the surrounding *osseous* structure.

That excellent microscopist and careful observer, Prof. J. H. McQuillen, agrees with this position, and has informed me that all sections in his possession substantiate its truthfulness.

While upon the subjects of osseous union, attachments, and fusion, it seems to me proper to call attention to another form of tooth-union, which, while it cannot be regarded as coming under the head of exostosis, might yet readily be mistaken for "fusion."

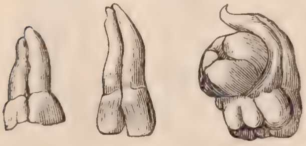
I refer to

GEMINOUS TEETH.

The difference between these and "fused teeth" is the possession, *practically*, of *but one pulp.*

If two pulps (Diagram VII.) originally existed, close proximity and pressure has produced pulp-fusion instead of tooth-fusion, and, although the root-formation will show at one time gemination, and at another the distinct root-formation of multi-rooted teeth, a section through the crowns will invariably disclose but *one geminous pulp.*

DIAGRAM VII.



Thus, fused teeth are rendered such by irritation of root-tissue, geminous teeth are the product of abnormality in connection with crown-tissues.

Geminous pulps are found to pertain almost exclusively to centrals and laterals, although a lateral and cuspid will sometimes be found thus united, but geminous molars are extremely rare; from among a large number of united molars, many of which I possess, and others having been shown me, I have seen but one instance of gemination (proven to be such by sawing asunder); all the others are cases of fusion.

As geminous teeth are sometimes very unsightly, and are particularly so from their conspicuous position, I would at this time warn against any attempt at improving their appearance by dividing them. Such operation will inevitably open the pulp-cavity and necessarily eventuate in the death of the pulp.

(To be continued.)

REGULATION OF THE TEETH MADE EASY BY THE POSITIVE SYSTEM.

BY J. N. FARRAR, M.D., BROOKLYN.

IV.

In the Dental Cosmos of January, 1876, the theory and practice of regulating the teeth with apparatus constructed and operated upon the principle of the screw (positive system) was explained.

In the numbers for October, 1877, and January, 1878, the method of application of this principle in the rotation of teeth within their sockets was illustrated by a few typical forms of apparatus, sufficient to enable any person, by the adoption of slight deviations, to meet the contingencies which may occur in different cases.

The present chapter will be devoted to a consideration of the lateral irregularities of the teeth, beginning with that in which the teeth are found on one or the other side of the esthetic line of the arch. This condition of things, though sometimes inherited, is generally to be ascribed to some extraneous cause, such as thumb-sucking or undue pressure of antagonizing or of contiguous teeth. The age, health, and general circumstances of the patient are great factors in suggesting what course should be pursued, for what may be practicable in one case may be impracticable in another. Having a clear knowledge of the degree of departure of the teeth from their proper position, and the cause of the deviation, the practice should have in view, if possible, first to overcome and do away with the cause. If the irregularities of the teeth be inherited, their correction may sometimes (though not often) be somewhat more difficult than if produced by a mechanical or extraneous cause, such as lateral crowding of other teeth by improper articulation with teeth of the opposite jaw, or from something foreign to the mouth, such as a pipe-stem, pencil, or the sucking of the thumb. But these different causes are, as a rule, of slight consequence, for by the positive system of mechanism one class may be regulated about as easily as another, the only difference being in the matter of time and apparatus; but when once corrected, experience shows that inherited irregularities generally require that the teeth shall be retained in position by some artificial means, after completion of the process, longer than if the irregularities have been caused by mechanical or extraneous causes. But if the "stay apparatus" be made properly, light and delicate, as it always can and should be, patients do not often mind wearing it for a long time, for one, two, or even three years.

There are three principal forms of irregularity,—those without the esthetic line of the arch, those within this line, and the mixed forms, covering both the former. Leaving the two latter for future consideration, we will confine ourselves in this paper to the first. The third class, or the mixed variety, is the most difficult of regulation; the other two, though generally requiring about the same time, are more easily managed; and, though the apparatus may require considerable skill, the working of it is exceedingly simple.

The object sought in cases of the first class, where teeth are outside of the proper line, is, of course, to get them into line and to keep them there, by means that shall be as little troublesome to the patient as possible. Our aim should be comfort and economy in time and expense, and as little interference with personal appearance as possible.

Having given the question much consideration I will say that unless it be very desirable to depress teeth in their sockets,—a practice which, though possible of accomplishment, is, I am convinced, not only unnecessary, but contrary to all physiological law, and believing the result sought can be better, and more cheaply and quickly accomplished, with less pain and trouble by other methods, and as all necessary movements of the teeth in any direction can be better made by forces from, and by apparatus entirely within, the labial orifice, which cause at the same time the least inconvenience and personal disfigurement, and because the mechanism constructed upon the principles of the positive system will best meet the various contingencies, the entire practice of regulating teeth may be summed up under the following aphorisms or fundamental rules for constructing and operating mechanical appliances for such regulation, and which, it seems to me, will be self-evident to those who understand the philosophy of the positive system in theory and practice:

1st. All mechanical appliances for regulating teeth should, if possible, be constructed upon the principle of the screw or inclined plane.

2d. All apparatus for regulating teeth should be constructed with the view of being worn inside the mouth.

3d. All mechanical appliances should be so constructed as to cause as little pain and inconvenience to the patient in speech and eating as possible.

4th. All apparatus should be constructed as minute and as delicately as possible, and be capable of doing its work with certainty and effect.

5th. All appliances should be so constructed as to relieve the patient as much as possible of the necessity of going to the dentist to have it adjusted; in other words, so that the patient can, with a little instruction, do most of the work, by means of keys to turn the screws and nuts.

6th. Forces for the movement of the teeth should be applied once in about twelve hours, and as powerfully as possible, short of causing pain,—a point which may be best determined by the patient.

Passing over, for the present, irregularities of the bicuspids and molars, which may be treated in a similar manner, we will consider the regulation of the front teeth, and take for a typical case the ordinary "thumb-sucking" type of irregularity, where the four, or six, upper front teeth project abnormally.

These cases are not uncommon, the angular face, often thin and scrawny, exposing the teeth, hanging over the under lip, presenting a repulsive appearance, and causing lisping and imperfect speech. When not inherited, the irregularity, as before said, is generally the result of mechanical or extraneous causes, easily discovered. Whatever these causes may be, they should be the first point of attack by the dentist. The habit of thumb-sucking must be broken up. This may be done by tying rags upon the thumbs, or by frequently wetting them in an infusion of quassia, the bitterness of which will deter the patient from the habit. Should the deformity be found to be due to improper articulation of the lower front teeth, forcing them against the palatine surface of the protruding teeth, this must be prevented. This may be sometimes accomplished, though with difficulty, by means of gags or pads placed between the jaws, with the view of keeping them apart; but a better way is to shorten the cutting edges of the lower teeth. This is a sure, speedy, cheap, and, I think, a better method than the slow, uncertain, troublesome gag, which often discourages both patient and parents, leading, perhaps, to the abandonment of the attempt to regulate; and even when successful, by keeping the jaws apart long enough to allow the drawing in of the protruding teeth, they often require shortening subsequently.

As this is a point upon which there are diverse opinions, it may be well, in order to a clearer understanding of my position, to dwell a little upon it.

There is a notion, accepted by many and taught by some to be a universal law, that teeth, when pressure of antagonizing ones is removed, will universally rise in their sockets. Relying upon this theory, they contend that when the front teeth have been forced forward by the opposing incisors, because they happen to be more prominently developed than the grinding teeth, if the jaws can be kept apart by some means these delinquent teeth will rise rapidly and uniformly. By this plan, it is thought, the difficulty arising from undue pressure against the front teeth will be obviated, so that they can be drawn in.

If this were true, it would seem that this method would be sufficient; but experience often discovers troublesome little facts that mar the most plausible hypothesis.

Even if teeth that have lost their antagonists should, through the operation of some regular and universal law, rise with a uniform rate of motion, it would be questionable whether it would be prudent to subject the patient to the great inconvenience of the gag method for weeks, perhaps months, when the object sought could as well be attained in thirty minutes with a corundum wheel.

Close observation and a careful record of these cases (having lost their antagonists) has convinced me that there is no law which causes them universally to rise. Furthermore, the rate of motion, even where they do rise, is as variable as possible. The truth is, only a portion of the teeth that have no antagonists rise in their sockets. This is true even of molar teeth, in which it is most likely to happen. In my own mouth I have a superior wisdom-tooth that has had no antagonist for twelve years, and a lower sixth-year molar that has had no antagonist for twenty-three years, and neither of them has risen in the least. I can refer to numerous like cases among my patients. Again, I will refer to supernumerary teeth, which erupt inside of the mouth and have no antagonists. Do they drop out? It appears that the shape and relative position of the roots and the degree of hardness of the alveolus have much to do with this matter. Diverging and converging roots offer less opportunity to rise than conical or straight roots. But even conical and straight roots do not universally show the action of such a law. The front teeth of numerous cases of greatly protruded upper jaws which never come in contact with the lower teeth do not. Nor do those gaping cases where, owing to the back teeth coming in contact too soon, the front teeth are permanently prevented from approaching nearer than say one-fourth of an inch from each other.

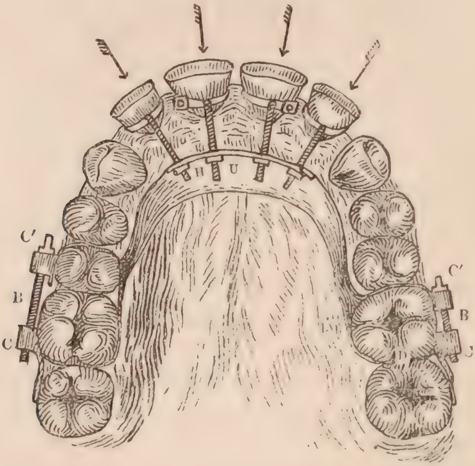
In my practice for several years, I have filled not only short stubs of crowns, but "sound roots," and have very seldom seen them rise; much less frequently, indeed, even than whole teeth.

The more I study these cases the more I am convinced that there is more than one cause for the rising, while I have seen a very few cases where one, two, and three teeth, having no antagonists, have dropped or risen bodily, gum and all; I have found that, in a vast majority of those rising cases, the teeth are not followed up by the gums, but have left the socket and gum behind, which, as often as otherwise, have receded. Again, I find in a majority of these cases that the teeth are pulpless, and are apparently being ejected by nature as foreign matter, and that a very large proportion of the live teeth which have risen did not start until after some lengthy mallet operation, which apparently induced some pathological condition between the socket and cementum. Again, I have observed in regard to a considerable portion of those teeth which have risen without any pathological cause, that their rise was due simply to a wedging encroachment of contiguous teeth, which, owing to the slight movement of (all) teeth in their sockets during the act of chewing, work back and forth, and mechanically crowd the widowed tooth out of its home. A remarkable case of this kind (superior sixth-year molar) came under my notice last week, in the mouth of a healthy young lady of eighteen years of age, whose teeth were so shaped as to wedge it nearly out.

While it is possible that the power exercised in mastication may prevent the full eruption of one or two teeth, as may sometimes be seen in cases of delinquent wisdom-teeth (especially the lower), where the tooth's antagonist has attained its full length above the gum, it is very doubtful whether the eruption of all the molars and bicuspids can be prevented, or materially retarded from normal development by the slight stress upon so many teeth made by the simple act of chewing. As there is no uniformity in these cases,—some teeth rising considerably in a few months, others not at all, and still others in various degrees between these extremes,—it will be seen that this raising of teeth by the gag method of relieving the pressure of front teeth is not to be depended upon, because of the irregularity in the degree and extent of this rising, which may injure the articulation. Cases of this sort are on record where this treatment, it is said, has led to years of trouble afterwards. The gag method, for this purpose, therefore, appears to me to be improper for our object.

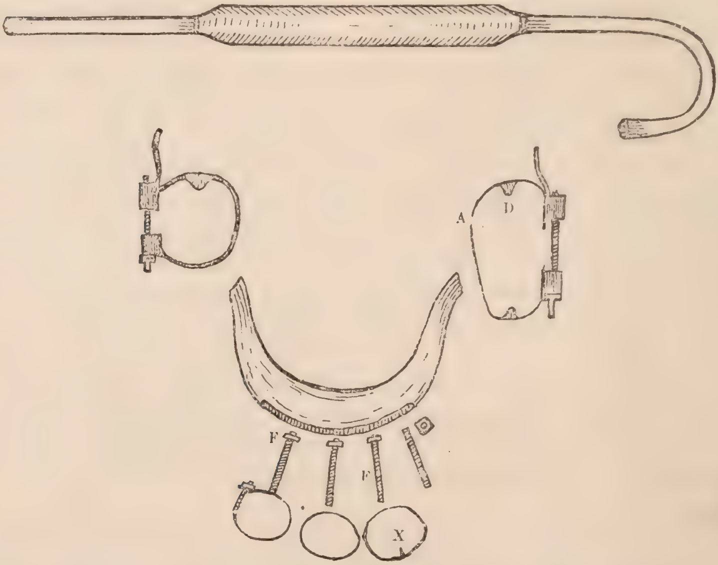
Having removed the cause of the distortion of the teeth, I take an impression of the jaw and teeth (generally in wax), and, having made a cast, sketch it upon paper, and, with the cast and patient before me, and a knowledge of the median line and lateral sway (if any), I indicate by arrows on the diagram, as shown, the line of direction in which the tooth should be moved, which serves as a

Fig. 7.



guide in the construction of the regulating mechanism; after which the apparatus is made up of parts about as follows:

Fig. 8.



Having determined upon one or more posterior teeth (molars or bicuspids) on each side of the jaw to be used as anchorages, a band-clamp (A) made of very thin (like paper) gold or platinum, about one-tenth of an inch wide, is constructed to fit around them firmly, by means of a bolt (B), passing through nuts C, C′ (one plain and the other threaded), which are soldered, one to each end of the band (A), as represented in the cut. To prevent these clamps from working down and impinging upon the gums, they should be cut from plate wide enough to make one or two ears (D) in suitable places, which, when bent over and into the convolutions of the grinding surface, act as stays to prevent undesirable movement. Should the teeth be short, the bands may be made to hold firmly to the teeth by soldering on the inside clamp a small pin-like point, X, which will fit a small hole drilled into the tooth.

Connected with these anchor-clamps by means of a little hook and ring (not shown in the diagram) or by solder, is a slim swaged platinum U-shaped plate, about one-quarter to one-half of an inch wide, which extends forward along the inner wall of the dental arch to within about half an inch of the protruding teeth, and which lies flat and snug to the gum and roof of the mouth.

On the front margin, and in line of the forces to be given, are punctured ears (H), bent at right angles with the plate, or as many smooth-bored nuts (not shown in the cut) as there are teeth to be moved, through each of which passes a small bolt (E), having on the threaded end a nut (F). On the dental extremity of these bolts or screws are soldered loosely, in the eye of each a small ring (not shown in the cut), each of which bolt-rings is connected by solder or hook to little metallic clamp-bands secured firmly around their respective teeth. Sometimes, when it is found that the bulk of the rings or screws would require that the lower incisors be cut away too much in order to prevent contact, it is an excellent plan to solder a small piece of thin (clamp) plate between the clamp and the screw, which will take up but little room, and will be as pliable as any ring-joint.

Although these joints between the bolts and teeth are not absolutely necessary in all cases, they serve to enable the forces to be made to universally draw directly from nearer the central portion of the tooth, and in an upward, as well as backward, direction without liability of leverage, which may occur should the angle at the joint of union between the screw and the clamp-band not be soldered rightly, so as to enable the screw to draw and lie closely to the roof of the mouth. This joint is important, in order to permit the draught to be made (not only back, but slightly upward), so that the teeth will not tend to be drawn out of the sockets.

These screws act as draught-rods upon the teeth to which they are fastened, and by means of the nuts, when tightened at the opposite extremities and behind the ears soldered on the plate, are under perfect control.

This apparatus being now secured so firmly and strongly that it cannot be dislodged by the act of eating or speaking, is ready for use, and is operated simply by turning the little nuts with a curved key once in about twelve hours, just enough to occasion a sensation of snug drawing (like that from very slight wedging), but not enough to produce pain or unpleasant sensation.

For reasons I will not stop to explain here, the most favorable hours in the twenty-four for tightening the apparatus are about nine A.M. and in the early evening. The sensation of slight pressure will pass away generally in from thirty to sixty minutes after the operation.

When several teeth are being moved at the same time, it is well to alternate the tightening process of one portion of the nuts with that of another; for instance, the two outside nuts at early morning, the inside nuts at noon, and the outside ones again at night, reversing the order the next day. By this means the sense of all being tightened at once, which might otherwise amount to something of a dragging sensation, disagreeable but not painful, will be obviated. The separate tightening is unnoticeable. Should there be pain after the operation, it will be evidence that too much force was applied, and the tightening should be reduced.

This form of mechanism is not only strong and practical, easily managed, safe, and convenient to the patient and operator, but it can be managed most of the time by the patient, who, with slight instruction, can turn the nuts with a key, rendering it unnecessary for him to visit the dentist oftener than once in a week or ten days. It is also free from objection in regard to personal appearance, as only the very thin gold bands one-twelfth of an inch wide which pass around the teeth to be moved can be seen.

When the teeth are fully regulated they should be retained in position for at least a year, perhaps longer. This may be done by a delicate apparatus made of narrow bands and strips of gold around the teeth, and secured to a delicate rim of plate-work or plate wire connected with the bicuspids; or they may sometimes be retained by wearing a simple suction-plate, having gold fingers passing between the teeth and bent nearly at right angles in front. Whatever the apparatus be, it should be kept clean and free from collections of food.

(To be continued.)

ON THE USE OF DENTAL MALLETS AND HEAVY CONDENSERS.

BY JAMES S. KING, D.D.S., PITTSBURGH, PA.

I DESIRE to offer some general remarks in relation to the use of dental mallets, dental automatic pluggers, and heavy condensing instruments, in filling teeth with gold. Since the general adoption by the profession of cohesive gold for filling teeth, in connection with the use of the dental mallet, I have seen results following that were valuable and good in every way. I have also seen results that were otherwise. I have repeatedly seen operations from the hands of some of our most eminent and skillful operators that were disastrous failures. In some cases it was evident that they were the direct result of excessive and injudicious malleting. I have also witnessed failures in my own practice, which evidently resulted from improper use of the mallet and the want of instruments better suited to my purpose.

The best material for a dental mallet is perhaps an unsettled problem. Wood, steel, iron, brass, zinc, tin, lead, ivory, horn, vulcanite, etc., have each had their advocates. Many of the materials named have been found wanting in necessary qualities, and have been abandoned.

Automatic mallets and automatic pluggers have been brought forth in quick succession, and their wonderful achievements have been heralded to the ears of an expectant and credulous profession. They have had their day, and now the profession is calmly collecting facts, and passing judgment upon the results that have been achieved. The principles that govern in philosophy and mechanics as well as experience plainly teach that, in order to consolidate cohesive gold foil to a given density throughout the entire mass of a filling by the use of a condensing force, such as will inflict the least possible degree of pain upon the patient, it is necessary that the operator should take cognizance of the laws which are involved. For instance, to make a filling of equal density in all its parts, using a moderate degree of force for consolidating purposes, the gold used should be uniform in volume or thickness, also in cohesive quality and in ductility; it should be manipulated with consolidating instruments of equal weight; the impacting points should be of equal superficial area, and alike in their serrations. The weight of the mallet used should be the same throughout the entire operation; the distance traversed by the mallet, its velocity, and the propelling force communicated by the hand of the malleter imparting momentum, should be regularly the same in each blow given, thus establishing as nearly as is possible a uniformity in results in the impacting of the gold.

The condensing surface of the consolidating instruments should never exceed in diameter or square one twenty-fourth of an inch, ranging down to one forty-eighth of the same unit. Consolidating points of the character just described, when placed upon a wood stem, weighing together only two pennyweights, require very light malleting in order to properly consolidate nine thicknesses of No. 4 cohesive gold foil. Observing the rules indicated above in most, if not in all, cases of consolidation of gold fillings, operators of equal tact and equal skill will accomplish like results.

It is not my design to point out in detail the many objections that obtain against the various dental mallets, and the difficulties encountered by operators in the use of the same, in all their forms and phases, automatic and otherwise. My chief purpose is to call the attention of the profession to a new form of instrument for consolidating gold fillings, viz., an instrument or point set in a wood stem. The purpose of the wood stem is to receive the blow from the mallet, transmitting its momentum to the point of the instrument where consolidation of the gold takes place. In the use of the wood stem in connection with an invention called "The King Dental Malleter," we have one of the most successful and satisfactory malleting instruments in use in modern dentistry.

I now call the attention of those interested to the weight of some of the instruments put forth upon the market by different manufacturers to be used in the consolidation of gold fillings. I have in my possession a condensing instrument on which is stamped "J. Biddle, N. Y.," which weighs 25 dwts. 10 grs.; an Atkinson Omega, 18 dwts.; an Atkinson plain, 15 dwts. 12 grs.; a Butler, 15 dwts. 1 gr.; a Head, 11 dwts. 6 grs.; a Varney, 8 dwts. 3 grs.; a Blake's Varney, 9 dwts. 3 grs.; an S. S. White Snow & Lewis point, 2 dwts. 3 grs.; King's wood stem with point inserted, 2 dwts.

A simple axiom in philosophy is, "When bodies act on each other action and reaction are equal." The plain meaning of which is, that when a body receives a blow it gives to the striking body an equal blow. This law applies in every case where a force acts upon a resistant. Applied to the dental mallet and its resistant, it is significant of something imaginary or tangible to the patient. For instance, should a crowbar, properly pointed and nicely serrated, be used as a consolidating instrument,—a fitting likeness to some dental instruments now on the market,—the operator using a two- or three-ounce mallet for consolidating, the degree of velocity of the mallet which would be necessary in order simply to overcome the inertia of the crowbar, and to establish sufficient momentum for consolidating purposes, would greatly worry the operator, and would equally interest the patient. If, in lieu of the crowbar, an instrument is used weighing only one-twentieth or one-thirtieth the weight of the mallet, there is insured a successful impacting of the gold, and also much more comfort to both patient and operator. The extra momentum of the mallet required to overcome the unnecessary extra inertia of the 25-dwt. 10-gr. instrument over that of the 2-dwt. instrument is more than is necessary for condensing purposes, when a properly-pointed light condensing instrument is used.

I have on my desk a "copy of a monograph, by Prof. James Truman, on the comparative value of the electro-magnetic mallet over all other processes heretofore made use of for filling teeth." In this is given a statement of results obtained from experiments made by Prof. Truman, which, so far as they were conducted, were in the right direction. In the test experiments referred to above, Prof. Truman's avowed purpose was to "examine, by actual experiment, the relative merits of the metals in prominent use in mallets." The first of his experiments, as recorded in the paper before me, was by means of an instrument constructed upon the principle of a pile-driver, in which were used steel, lead, and wood mallets. The results obtained proved to my mind some facts that were interesting, but there were other facts and principles involved which were apparently overlooked by Prof. Truman, viz., the varied results arising from the difference in weight and in the size of the condensing surface of the various instruments used in his experiments. For instance, if the superficial area of the condensing surface of the instruments used had been given, accompanied by a report of the results derived from experiments made with instruments of large and small condensing surfaces, applying to each the same force, placing under each condensing-point cohesive gold of uniform quality and thickness, would not the results in condensation under the same blow or force vary in proportion to the difference between the superficial areas of the condensing surfaces?—unless, regardless of all conditions or circumstances, either in the mouth or out of it, the blows given were sufficient in degree of force to condense the gold to that point, in each case, beyond which gold cannot be further condensed.

There is a mechanical principle involved in these experiments which cannot be ignored. It is found in the difference between the superficial areas of the condensing surfaces of the instruments used, the thickness or volume of the gold being condensed, the force of the condensing blow, and the inertia of the condensing instruments used.

I present that portion of a table of experiments by Prof. Truman which consisted in inserting gold fillings in a hardened steel matrix placed upon the bases named:

Experiment.	Materials Used.	Character of Force Applied.	Base.	Weight in Milligrammes.
No. 1...	Gold scraps.	Electrical mallet.	Soft cushion.	287½
" 2...	Gold.	6-oz. wood "	Spunk.	180¼
" 3...	"	Automatic "	Dense cushion.	217
" 4...	"	½-oz. steel hammer.	Wood.	236½
" 5...	"	2-oz lead mallet.	"	229
" 6...	"	8-oz. steel "	Spunk.	202½
" 7...	"	8-oz. lead "	Steel.	237½
" 8...	"	Electrical "	Cushion.	290¼
" 9...	"	8-oz. steel "	Soft cushion.	180½
" 10...	"	Electrical "	Hard base.	287
" 11...	"	" "	" "	272
" 12...	"	Hand-pressure.	Wood.	231½

The above table of results, so far as it goes, is worthy of our careful consideration in its practical application to operative dentistry. Prof. Truman derived therefrom the following conclusions:

1. That hand-pressure in the mouth can never condense as thoroughly as the mallet.
2. That weight cannot overcome mobility.
3. That density and velocity are requisite in a mallet.
4. That for hand-malleting the light steel mallet is to be preferred.

The sum of the above conclusions—based, as they are, chiefly on density and velocity—is seen to be in favor of the electro-magnetic mallet, conceding to that mallet density equal to any of the others, also a greater degree of velocity. Prof. Truman failed to say that in each case he used consolidating instruments of equal weight and equal in area of condensing surface, and gold of uniform thickness and cohesive quality. Had he so said, I would coincide with him in his deductions, on the assumption that he has correctly presented the facts involved. But inasmuch as he failed to do this, I claim that important philosophical and mechanical principles in the practical condensation of cohesive gold in filling teeth have been overlooked by him. These are the relative degree of force necessary to accomplish the proper condensation of gold, the weight of the condensing instrument, the area of the condensing surface, and the thickness or weight of gold best suited to the object in view.

For the purpose of testing the relative merits of the Bonwill electro-magnetic mallet and a recent invention, now in use, called by the inventor thereof (Courtlen King) "The King Dental Malleter," and to test, at the same time, the relative merits of heavy and light condensing instruments, under the same force, in the impacting of cohesive gold foil, I had my brother, M. S. King, insert in a hardened steel matrix four gold fillings,—two with each of the dental mallets named above,—requesting him to be exceedingly exact, and particular that every condition should coincide during the insertion of each filling; the matrix to occupy the same firm position during the operation in each case, and the same condensing-point be used in making each filling; that the gold should be J. B. Dunlevy's No. 4 cohesive gold foil, folded to nine thicknesses of the sheet of gold, and cut in strips or ribbons one-twelfth of an inch in width; that each filling should be made with the mallets working horizontally, and so at a right angle with gravitation; that a heavy and a light condensing instrument be used with each mallet, and that the fillings, when inserted, be filed down level with the matrix; and that in all these respects he should endeavor to secure, as near as possible, like conditions in each case, in order that each mallet should have an equal chance during the insertion of each filling. He claims to have given due attention to all of the conditions named, and avers that the electro-magnetic mallet was in excellent working order, and was run with a lively three-cup Bunsen battery in splendid condition.

The results I give below in tabulated form:

	Mallet Used.	Composition of Stem.	Weight of Condensing Instrument.	Weight of Fillings in Milligrammes.	Troy Weight of Fillings.
No. 1	King mallet.	Wood stem.	2 dwts. 0 gr.	414	6.3932 grs.
" 2	" "	Metallic stem.	14 " 6 grs.	$396\frac{4}{10}$	6.1214 "
" 3	Electrical mallet.	Wood stem.	1 dwt. 15 "	$351\frac{1}{10}$	5.4218 "
" 4	" "	Metallic stem	9 dwts. 6 grs.	$339\frac{3}{10}$	5.2496 "

The results very clearly demonstrated the gain in the use of light condensing instruments and of the King malleter, as well as the convenience in quickness of application, in comfort to the patient and operator, and in other important particulars. The motive-power that brings into action the Bonwill mallet is a troublesome electrical current, requiring much attention, if not constant nursing. In the other, the index-finger of the right hand moves into quick action the mallet, which is always in order.

I am greatly indebted to Mr. Otto Wuth, analytical and consulting chemist, of Pittsburgh, for the accurate weighing of the fillings in milligrammes, and their reduction to grains and fractions thereof in troy weight.

DIRECTIONS AS TO THE TREATMENT OF THE SO-CALLED RIGGS'S DISEASE WITH THE INSTRUMENTS DEVISED BY DR. RIGGS.

BY GEORGE A. MILLS, BROOKLYN.

Dr. Riggs's instruments are six in number. Their peculiar value is in their forms, which make it possible to reach the remotest parts of the diseased structures. Nos. 1 and 2 are rights and lefts, and are designed to be used on the approximal and buccal surfaces of the molars; generally from, instead of towards, the operator. Nos. 3 and 4 are also rights and lefts, with the cutting edge towards the handle, and are intended to be used on all the surfaces of the ten anterior, superior, and inferior teeth, and also on the lingual and palatal surfaces of the molars. No. 5 has two cutting edges towards the handle, is thin, and spring-tempered; to be used between teeth closely approximating to each other. No. 6 has two cutting edges towards the handle, and corresponds in shape to Nos. 3 and 4, and is for general use.

In order to facilitate the operation, and to be sure that the ground has been thoroughly gone over, it is safer to establish something of a system in the operation. For instance, if the anterior inferior teeth are to be operated upon, commence at the mesial line, with instrument No. 3; standing on the right side of the patient, with the left arm thrown around the patient's head to the left side; the fingers of the hand placed under the chin, and the thumb resting on the cutting edge of the teeth or on the lip; the right hand grasping the instrument, with the thumb resting upon the teeth or jaw for support, and beginning at the mesial line on the proximate surface of the right central, drawing the scaler with a circular motion towards the labial. Having completed the operation on that part of the tooth, not only to the extreme point of the disease, but beyond and into the live tissue (the operator can detect by the feeling, which is transmitted readily to a hand trained to a delicate sense of touch, the difference between living and necrosed tissue), pass to the next tooth, cleansing the same surfaces in the same manner to the same point, and continuing on each tooth to the posterior approximal surface of the second bicuspid, as a general rule. From this point, taking up instrument No. 1, pass on with it to the third molar in the same manner, with the exception that the movement should be from, instead of towards, the operator. Then coming back to the mesial line, with instrument No. 4 operate on the same surfaces in a like manner to the same point on the left side, up to the point at which instrument No. 1 was taken up. Then substituting instrument No. 2, pass on to the third molar, as before directed. We have now been operating from right to left on both approximal and labial surfaces. We now consider the operation about half completed. We again come back to the mesial line, and operate from left to right in the same manner; this being done, we have completed the operation on the lower teeth, with the exception of the lingual surfaces. We again commence at the mesial line, and operate from right to left, and from left to right, using instruments Nos. 3, 4, and 6, according to convenience. This being done, the operation on the lower teeth is supposed to be completed so far as the Riggs instruments are concerned.

Experience, which is the best teacher, will direct the operator in all the different stages of the disease that may come under his notice. It will require no little patience, perseverance, and experience to become an expert in this operation, but the reward will come through success, and will be a great compensation. No operation performed by the dentist in the mouth is more appreciated by patients after they have seen the results. It is really a surgical operation, and is of vastly more importance than has been attached to it by the profession generally. The teeth and all the exposed portion of the roots must now be polished; the nicer the better. A very efficient method of polishing the necks and crowns, and even down on the roots in many instances, is by the use of various widths of *tape*, with pumice or other polishing powders. To make the tape efficient in covering the entire surface, double it in the form of the letter U, placing it over the tooth to be polished, and taking the ends and crossing the tape around the tooth, giving a backward and forward motion, quickly and gently, up and down. A clean, polished surface can thus be secured more quickly and more perfectly than in any other way. A soft string used in the same way is efficient, as are also all the polishing appliances used in connection with the dental engine. After this operation is completed, have the patient rinse the mouth with lukewarm salt-water; the salt in the proportion of a teaspoonful to a goblet of water. Now pack around the teeth a sufficient supply of Japanese paper, and absorb the excess of moisture, then apply the officinal aromatic sulphuric acid with the Farrar syringe, which is doubtless the neatest and most efficient instrument we have at the present time, because of the long and delicately-constructed gold tubes, and the method of forcing the acid direct to the parts, and avoiding its escape into the mouth, by means of the screw on the piston. This completes the entire operation upon the lower teeth. The patient should be directed to wash the mouth thoroughly from day to day with lukewarm salt-water; and if inconvenienced by tenderness or pain about the teeth, may be instructed to apply tincture of myrrh, which will afford immediate comfort. Give earnest and intelligent directions as to the manner in which the teeth should be brushed; not crossways, but with a rotating motion, the inferior teeth from the gums up, and the superior teeth the reverse. Impress upon the patient the importance of more than ordinary effort, and give the assurance that this method of brushing, faithfully carried out, will prevent the return of the deposit upon the teeth. This I give as an answer, which is incontrovertible, to the remarks so often made, that if the deposits are removed they will again return. I say it without hesitation, for I have been making observations of late that prove it to be true, that faithful brushing by patients, under the instruction of the operator, will prevent it. Should the case which has been treated have advanced towards the third or fourth stages, as described in former articles, the amount of morbid tissue which might be more or less present can be brought more expeditiously to a healthy action by local treatment with tincture of iodine, but it will generally be found that the use of aromatic sulphuric acid will be sufficient. In extreme cases the patient should be required to revisit the operator, as directed by him, that he may watch the progress of the case and apply the remedies that may be indicated. At the expiration of about four weeks the congested tissue will have been displaced by a more healthy one. The case will now admit of a *revision* at such points as may indicate the necessity. In extreme cases, I have noticed a general improvement going on over a period of time extending to six months; giving indications at that time of an amount of success that the second or third month did not show.

I have perhaps said enough in these articles to convince not a few of the importance of this matter. Many have spoken to me regarding it, and have asked how great a percentage of the cases are amenable to treatment. Dr. Riggs claims *ninety per cent.* I think it true *in his hands;* in my own, the percentage increases with my experience.

"THE NEW DEPARTURE."

BY CHARLES E. FRANCIS, D.D.S., NEW YORK.

According to an old saying,—"to every individual specimen of the canine race is allotted a day of license,"—so every theory has "its day," and with members of our fraternity every method of practice also. We must keep up some sort of agitation all the time, in order to avoid stagnation. We enjoy excitement, and like to stir up a breeze,—blow a little ourselves, and listen with eager delight to others while they blow. Our societies, in order to keep up an interest in their meetings, *must* have subjects for discussion, and our journals must furnish such food as will tickle the intellectual palates of their readers. As new theories are propounded, we approve or dissent as reason suggests or prejudice disposes; we commend or condemn. *or*, perhaps, in regular order, do both!

The "sixth-year molars" have witnessed a perilous career, their walls having been beset at every vulnerable point. "Contour fillings" have beheld the glory of their conquests, or, through treachery of supposed supporters, have felt the collapse of their coronal brilliancy. "Exposed dental pulps" have passed seasons of therapeutic tillage, and "gold" fevers of every name have had their "run" and braved their dangers. Every question, in any way relating to the science and art of dentistry, has been thoroughly discussed, every subject well ventilated; from "Alpha to Omega" the entire list has passed the most trying ordeal; pen and tongue, the keenest of weapons, have put forth their best endeavors; and one might well suppose that nothing further could be said or written. But we have no new fields to conquer, so we return to old ones which we imagine have not been effectually subdued, and again renew the combat. We were not born to rest, so our old "dogs" must be brought to the front again for further "drill and inspection."

Well, what agony is now prominently before us? The "new departure," of course! The "Chase" has become exciting; the "Flagg" is flying at top-mast! But somebody says that "there is nothing new under the sun," not even "plastic stoppings." If, however, as some suppose, the term "new departure" signifies total abstinence from the use of gold, then indeed has a *new* and exceedingly strange doctrine been promulgated,—a "departure" seemingly suggested by a biased mind, or by mistaken observations of real practical results. Hundreds of the most experienced and worthy members of our specialty have borne witness to the value of the "precious metal" as a filling material, and by their operations have proved the efficiency of the "punching" process. We are not ready to believe that even the most zealous advocates of plastic stoppings condemn "in toto" the use of gold. We do believe, however, that they state many substantial facts regarding the indiscriminate use of this material, and trust that the warnings they utter may be heeded by those who decry every other material for stopping carious teeth. One-idea men are not always the safest guides. Better is it to study principles, examine theories, observe conditions, test methods, and then compare results. Following this course will tend to make us eclectic in practice, consequently better able to meet emergencies, and make our operations of greater value to those for whom they are performed. It should not be taken for granted that plastic stoppings are always stoppings of *amalgam*, although when under the heat of discussion they all seem to fuse into this material. Amalgam is indeed a wonderful substance,—so soft and pliable, so easily manipulated! No wonder it possesses such a fascinating charm to a perplexed and wearied operator when a most difficult and trying case suggests its use. But amalgam possesses peculiar characteristics, constantly giving surprises in divers ways. Sometimes it tends to preserve even the merest fragments of teeth in a remarkable manner, and in other cases, where the same degree of care is used in its manipulation, it proves treacherous and worthless. Perhaps no one material is more extensively used for filling teeth; certainly none is more *misused* or worse abused.

It has been asserted, and by more than one individual, that a certain popular dental society has so greatly encouraged the use of amalgam that the demand for it has been very greatly increased. Societies, as such, are not apt to commit themselves to any special course of practice, and the society referred to has certainly never done so. Opinions expressed by individuals in society gatherings, or published in our magazines, can be credited to those only who utter them. It may be well to observe that radical sentiments, though honestly entertained and earnestly stated, are not unfrequently modified or wholly retracted as the vision becomes clearer and the mind better illuminated.

The late and much-esteemed Dr. Elisha Townsend, who has been quoted altogether too much or *too little*, was for a time considered quite an advocate for amalgam fillings. Subsequently he advised that it be resorted to only in cases where no other material could be employed; and, finally, he retracted all that he had previously stated regarding the merit of this substance and abandoned its use altogether. Sometimes people seem to lose their balance, leaning too much this way or that, and in either case are in danger of falling. Better keep a level head and a firm footing, directed by sound reason and unbiased judgment, instead of being blinded by caprice or impelled by petty dogmatism.

COHESIVE GOLD.—A REPLY.

BY THOMAS FLETCHER, WARRINGTON, ENGLAND.

Some remarks having been made at a recent meeting of the American Dental Association referring to my experiments with cohesive gold, allow me, as a matter of justice to myself, to state what those experiments really were.

In the first place, I never attempted to make the "microscopic" plugs which were shown in refutation of my arguments; all my plugs were of large size, varying from ten to forty grains each. No plugs were made in glass cavities without either a secure anchorage of amalgam or perforations in the bottom of the glass cup; the greater proportion were made in cavities drilled or cut in ivory, these cavities being about one-fourth of an inch in diameter and one-fourth of an inch deep, with at least three pits for anchorage. Some few were made on a base of tin, and some on unannealed gold. Failing to get satisfactory results, I tried a large number of other operators, and in the course of six months I did not receive one sound plug made with cohesive gold.

I *then* published my failure, seeking for information. Immediately on its publication the professors of a well-known dental school in America drilled a number of tiny holes, less than one-eighth of an inch in diameter, in a block of ivory. Each of the professors filled one cavity in his own way, and at least half of these were unsound. I do not remember the precise number, but I believe that five out of nine leaked badly.

Before receiving this block I discovered and published the cause of my failure, and sent up to the Odontological Society a large, awkwardly-shaped cavity in ivory, which was perfectly color-tight, the gold in which had been packed at the rate of one grain per minute, the whole plug, weighing about eleven grains, having been packed and finished in less than twelve minutes. The cause of failure was simply the shape of the instruments used, which had flat, serrated faces, and which were the only instruments I could purchase at the time in England. The instruments I succeeded with were rounded and serrated on the face, precisely like a rose-drill, and the first of these instruments I used I made myself.

With these the proper working of cohesive gold becomes comparatively child's play, and I have used S. S. White's extra cohesive gold ever since, as being the easiest to use and making the soundest plugs. I then offered to the Dental School in London an annual prize of five pounds to the student who showed the greatest skill in the use of cohesive gold.

The experiments lasted over about twelve months, and were carried out in a careful and systematic way, beginning with failure and ending with success, and the whole details were published from time to time. The failures first recorded were not my own solely, but those of every operator I came in contact with who had sufficient interest in the matter to experiment.

Setting aside all other considerations, I have done far more good than harm by calling attention to the matter and showing a simple means of testing results and systems of working. If my own reputation is so small that it is lost by the publication of a failure, it must have been so very small that its loss will never be felt.

TRANSLATION.

THE DENTAL PULP AND ITS DISEASES, FROM THE GERMAN STAND-POINT.

TRANSLATED FROM DR. R. BAUME'S "LEHRBUCH DER ZAHNHEILKUNDE."

The dental pulp is an organ which has its classification with the connective-tissue organism. The object of its peculiar formation is to convey to the nutritive needs of the tooth vascular and nervous endowments,—in which endowments it is particularly rich.

As in the anatomical section of our work attention has been directed to the formation and relations of the pulp, we are permitted in this part to confine ourselves to the pathological considerations connected with it.

The pulp of a tooth is not at all the sensitive organ which, from the great pain arising out of an inflammation seated in it, it is commonly supposed to be. Not unfrequently opportunity is offered to examine the dental pulp while in a state of health, as when, for example,—zum Beispiel,—we cut off the carious crown of a tooth, otherwise in a state of health, with the purpose of affixing an artificial substitute. Under such circumstances we are justly to infer that the organ we expose is as yet intact and free of pathological complications, and it is undeniably the case that at the immediate time of such exposure very little consciousness is manifested by the patient of the condition that has been brought about. True it is that, sooner or later, pain is developed, but this is a result of what might be called spontaneous irritation arising out of the hurt. In the beginning this pain is trifling, never comparing with the ordinary pulpitis, several days ordinarily elapsing before a parallelism is found to develop.

Out of the circumstances described are we to deduce the conclusion that a normal dental pulp is not so sensitive in origin as it is commonly supposed to be.

The study of pulp-diseases—pulpenkrankheiten—is best pursued by taking advantage of affected teeth immediately upon their extraction. Great care, however, is necessary that an observer be not misled by his preconceptions. Just opinions are to be arrived at only after an examination and comparison of a multitude of apparently similar cases. Indeed, it is through such manner of observation alone that it is possible to secure the basis of a pathological anatomy.

To be able to get at pathological data one is first to acquaint himself with physiological facts. It is all-important to the man who would familiarize himself with pathological appearances that he first understand with all fullness what is the expression of the part to be studied when in a state of health. To such end, as the dental pulp is concerned, advantage is to be taken of the microscope; fresh pulps are to be secured in the opportunities offered by extraction, and such study given them as shall suffice to their proper recognition.

The diseased conditions of the pulp are to be studied in the pathological associations of inflammation, injuries, and new formations.

Albrecht, who has given to us a monograph upon diseases of the pulp, makes the following division of its diseases:

1. Disease of the nerve.
2. Disease of the blood-vessels.
3. Disease of secretion.

This division, however, being without foundation in anatomico-pathological observation, is found to serve but very little practical purpose; indeed, if it serves any end at all, it is to complicate and confuse. In describing the inflammatory expressions of the one Albrecht describes the others, hence his distinctions are practically of no consequence.

INFLAMMATION OF THE PULP.—PULPITIS.

Symptoms and consequences.—Inflammation of the dental pulp is the most common cause of odontalgia. The pain is introduced by a preliminary uneasiness, which, in the very sensitive, runs oftentimes most rapidly into an unbearable agony.

If, through a defect in the enamel, there exists the uncovering of the dentine, or if there is exposure about the neck of the tooth, or if the cement be never so little unprotected, proportionate irritability ensues. We have here the expression of the so-called sensitive dentine. Such character of pain is denotive of pulp-irritation; the paroxysms are short and sharp; they both come and go quickly; they are provoked by atmospheric changes, and as well by hot or cold food or drinks; sour or sweet increases the sensibility; biting on hard substances is likewise a source of irritation; cutting with sharp instruments produces unbearable pain. Very characteristic of the sensibility of exposed tooth-bone is the evanescent character of the pain resulting from contact with it of an agent of irritation.

The pain in these cases arises out of a deficiency in the proper covering of the tooth-bone,—the sensitive peripheries of dentinal fibers transmit the irritation to the pulp, when cognizance is taken of it. Later on, by reason of changes occurring in these peripheral tissues, the line of conduction between the agent of offense and the pulp may become broken, and when this is the case, the sensibility is found obtunded.

Little opportunity is afforded to study the appearance of pulps irritated because of defects in the enamel, for the reason that both patients and dentists join in effort for the preservation of teeth so affected. Only very occasionally is it that opportunity for such study offers itself, but wherever it presents there is to be met with the expressions of such irritation as witnessed in the hyperæmia always present; while at the place on the inside of the tooth which corresponds with the defect upon its face there is to be met with such expressions of active congestion as to scarcely need more than the naked eye for its showing.

Not always, however, does pain of the pulp follow exposure of the dentinal peripheries. Even when the internal face of the tubes are seen in a hyperæmic state, the pulp is often found in a state of reasonable resistance.

The conductors of irritation to the dental pulp are the cells of the substance, common in its relationship to tubules and central organ. The filling up of the tubules and the shrinkage of these cells break up such line of conduction, and is the process adopted by the part for self-protection. When great sensibility exists where a carious hole is of considerable proportions, an explanation is to be sought in the physiological nature of the bone intervening between cavity and pulp. Where the canals are obliterated by secondary deposits, and the connective associations are shriveled, no pain is to be expected, but up to the time of such occurrence conduction is complete.

As caries progresses, so in proportion is the exposure of dentinal surface, yet until the pulp-cavity is fairly laid open the patient may be without pain. With such event begins, however, for the pulp new conditions of irritation. Even before a fair exposure, while yet there remains a thin layer of diseased bone, these new attacks inaugurate themselves. Biting on a hard substance is not unfrequently followed by an attack of severe pain; hot and cold, sour or sweet articles of food are apt to have associated the same consequence. Spontaneous pain is not common at this period, and when occurring is not likely to be at all persistent. Even that pain which arises out of contact with an irritant is apt to go almost as quickly as it comes.

Spontaneous pain is, as we have said, not at all common to this period. That is characteristic. The pain, however, when it does occur, is of the same kind as that issuing out of free exposure. This absence of a distinction is prominently to be borne in mind. If the intervening septum be very thin, the danger of confounding the still protected with the uncovered pulp is made the greater. Diagnosis in these cases is of great importance, as a conservative dentistry is concerned. As a prognosis is involved, the chances of the preservation of the tooth are to be reckoned according to the thickness of the intervening layer of dentine.

The natural result of progressive caries is exposure of the pulp.

Out of the irritation thus engendered arises inflammation. The prominent symptoms of inflammation are redness, swelling, pain, and elevation of temperature. The heat, as an objective, is not sufficiently perceptible to serve as an index. The pain is apt to be of extraordinary severity. The redness and swelling are of an importance which demands careful consideration.

We take first a pulp in which resides a pain that drives its owner to demand extraction of the tooth. We find here, on examination, an organ that has changed to dark red, one that is turgescent and glossy, and which is enveloped in secretions,—these conditions being very evident. If no opening exists, there can, of course, be no accommodation. As a consequence, the pain arising out of the pressure becomes unbearable, to be relieved most quickly by extraction or by free opening into the cavity. If left to a natural cure, the congested vessels ultimately rupture, the contents of them being absorbed into the tubuli, the tooth assuming, in consequence, not unfrequently a bright-red color.

When an opening is made into the pulp-cavity the enlargement of the organ makes itself recognized through a part which projects, demonstrating thus a swelling of the pulp proper, and clearly showing that the pressure is not from an exudate external to it.

By the use of the microscope we are able to demonstrate minutely that which, in its general features, is evident enough to the naked eye. We see plainly the enlargement of the blood-vessels and the exudate diffused among the parenchyma of the pulp. The presence of the exudate causes derangement, which not unfrequently exhibits itself in a sympathetic disturbance in the surrounding dentine. One sees in some portion of the pulp-wall a space of considerable extent, which has become transparent. The immediate spot of decay has turned darker; the intertubular substance affords evidence of serosity.

Sometimes quite a different appearance arises out of a pulpitis. Generally, hyperæmia, as shown by the engorged vessels, is the characteristic expression. In many cases, however, as, for example, after the formation of new dentine, and in many forms of idiopathic inflammations, the vessels of the pulp have enlarged and extended themselves to a degree which mark them as prominent objects even to the unassisted vision; veins are seen—geschlängelt—twisting and twining about each other in a most tortuous manner.

When are present those signs of a pathological anatomy, namely, undue redness and swelling, so, as a consequence, is there also pain. Long, however, before any severity exists the presence of an inflammation makes itself felt. The hyperæmia, which already is of some standing, results in a pressure that is perceptibly felt by the patient as pulsatile throbs,—pulse in the tooth it might be called; pain may exist, but it is unimportant and little noticed. If, however, the pulp should lie exposed, it is, of course, subjected to many sources of offense. Carelessness of the patient in eating or in drinking, even breathing through the open mouth, will oftentimes subject the sensitive part to attacks of severest pain, and which is very slow in disappearing, differing in this respect most characteristically from the conditions previously described. Such a pain will continue several hours, and is to be obtunded only by a care that shall protect it against any and everything that might serve to keep up the irritation. Even when allayed it requires but the slightest offense to re-excite it.

In this explanation of the pain found so commonly associated with pulpitis it must be recognized that the cause of such pain lies not primarily in the inflammation. If inflammation was the cause, then most certainly pain would co-exist continuously with the inflammation. But that inflammation is not alone the cause is further to be recognized in the important fact that the inflamed pulp, so long as it remains overlaid and protected by the unbroken dentinal wall, is not, as a rule, a source of any trouble in such direction. The pain which drives the patient to seek relief is, as a rule, a result of an exposure which has subjected the organ to some attack from without. Accepting, then, that the pain is not necessarily an associate of the inflammation, it seems desirable that a study of the subject should be preceded by the laying down of such a premise. While, however, denying inflammation to be the cause of pain, yet, because it is so intimate and so associate a condition, it is proper that it is the first and principal thing to be considered in this connection.

Pain in an inflamed pulp follows at once on the heels of the irritant. The nature and persistence of the pain differ wonderfully; it is impossible to possess too great a variety of words for the description. It is to be spoken of as changing, pulsating, radiating, shooting, biting, sticking, etc. No less of variety is there in the persistence; it may continue only for minutes: it may prolong itself into hours and even days.

Very commonly the pain of a pulpitis is found intermitting in its character. The cause of this is generally evident to a closely-applied observation. Many, for example, are found subject to attacks at, or soon after, meal-times. Here little difficulty is found in appreciating the cause. At the time of eating, foreign bodies are necessarily brought more or less intimately in contact with the diseased organ. After meals a cause is found in a turgescence arising out of the fresh stimulus that has been added to the blood. In a multitude of cases the cause is to be looked for in the position occupied by the patient; thus, when supine, gravity is found to be the offending agent. Still another of the exciting causes is to be looked for in what is recognized as the neuralgic diathesis; while still again predisposition is to be searched for in constitutional conditions, as, for example, where there is gout, rheumatism, malaria, or syphilis.

It is natural that, when pain has been of long standing in a tooth, the patient is apt to be found forgetful of the primary exciting cause, even, indeed, had he recognized it.

The tendency to irradiation is a matter always to be held in mind when searching for the origin of an odontalgia. Nothing is more common than to have a patient point out as the seat or origin of the pain a tooth which examination discovers to be without break or flaw, or it may be the case that many teeth will be declared as aching at the same time. Take as an illustrative case an example where the true seat of pain lies in the lower left second molar, a tooth which has been for a long time carious, and which has an exposed and inflamed pulp. The patient comes to the dentist and points out, with great positiveness, as the source of trouble a right upper molar. The tooth is examined and is found sound; it is almost not possible but that the man should be mistaken. In many cases, however, the tooth pointed out is, as well, carious. Here a mistake is very easy to be made, demanding all care on the part of the surgeon.

When a pulpitis has been of long continuance the pain seldom is found restricted to the tooth, but is apt to diffuse itself over the whole trigeminal tract. At one moment a single filament is involved, the next the pain is everywhere. The suffering becomes more and more severe; neuralgia is in every part of the face; eyes and ears sympathize; there is intolerance to light, while earache combines with ear-ringing and difficulty of hearing to add to the discomfort of the patient. Hemicrania is a common sequence. The affection may extend its influences both to the sensor and motor nerves of neck, shoulders, arms, and neighboring sympathetic parts.

Sympathetic neuralgias are not the sequences alone of pulpitis; other diseases of the teeth are alike provocative of nerve-pain. It is not the place here, however, to enter upon any discussion of the neuroses; in another part of our work we will hope to give them a proper consideration.

Consequences of inflammation.—The consequences of pulpitis are to be classified as follows:

1. Die Chronische Pulpitis.	Chronic pulpitis.
2. Eiterung.	Suppuration.
3. Hypertrophie.	Hypertrophy.
4. Gangrän.	Mortification.
5. Wurzelhautenzundung.	Periodontitis.

1. Chronic pulpitis is that condition where an inflammation remains after the acute attack has subsided. In many instances, however.

the chronic is the primary condition. The pain attendant on such character of inflammation is commonly so trifling as to escape observation, a tooth oftentimes being completely destroyed without consciousness on the part of the owner that anything is the matter with it. In this manner very many people are found to lose all their teeth; a first indication of trouble lying in the breaking or crushing of the crowns; absence of pain allowing absence from mind of the dentist, until all that remains of a denture is a lot of worthless roots.

In examining pulps of this character, one distinguishes little difference between such as are inflamed and such as are not inflamed; death treads rapidly on the heels of irritation. In place of vital resistance one finds only an unresisting, decomposing, greasy mass. In such absence of vitality is explained the painlessness of the death and this misfortune of the patient.

2. Suppuration is ushered in by a feeling on the part of the patient of fullness and heaviness in the affected tooth. The periodonteum is apt to feel the irritation, and when this is the case pulsatile pain is the result; such pain may, however, be trifling and unimportant. A feature in these cases is the rapid development of œdema in and about the face.

The anatomico-pathological expressions of such cases show that suppuration may have extended to the substance of the pulp at large or may have confined itself to a part. Generally it is the case that the suppurative action is found to be progressive, involving little by little the parts until destruction is complete. As a result of observations sufficiently extended,—Zahlreiche,—any one will find himself convinced that suppuration is the commonest termination of chronic pulpitis. The evidences of pulp-suppuration are not to be recognized without a sufficiently closely-directed attention. Where the pulp lies exposed it is difficult to find the pus at all, the fluids of the mouth quickly washing it away.

To study the process, a proper way is to use the closed teeth that come into our possession. By making sections of these while in the recent state there is no trouble in seeing, by the aid of the microscope, the pus-corpuscles as they lie in bulk or are to be discovered overlying the granulation layers.

When a pulp is semi-vital, and attempts at granulation exist, a hyperæmic condition of the organ plainly shows itself throughout the still persistent parenchyma. In other cases, namely, when pus results from a high grade of inflammation, the organ at large will commonly be found to have broken down in mass. In these instances the pulp-cavity will be found to contain one or more drops of pus. In healthy subjects this pus is laudable, in most instances. Scanty, watery pus and pus of an acrid nature is to be met with alone where there is constitutional sickness, or where disease of the overlying parts has preceded or induced the suppuration.

When pus remains for some time fast sealed in a pulp-cavity, and consequently without relation with external influences, it is in occasional cases to be observed that in place of the scanty, watery fluid only a pasty, smeary portion remains, this being of an odor distinguishingly offensive; the smell being of that general character with which all dentists have been made familiar by the ordinary putrescent pulp.

In these cases the *débris*, in consequence of the absence of fluidness, is quite thick, being, as shown by the microscope, very rich in fat; indeed, it is quite cheese-like. A. B. C.

(To be continued.)

PROCEEDINGS OF DENTAL SOCIETIES.

NEW YORK ODONTOLOGICAL SOCIETY.

SPECIAL MEETING, HELD JANUARY 9TH AND 10TH, 1877.

(Continued from page 61.)

WEDNESDAY, JANUARY 10TH—*Morning Session.*

THE following paper, entitled "Notes on Operative Dentistry," was then read by Dr. W. St. George Elliott, of New York:

MR. PRESIDENT AND GENTLEMEN,—I have chosen the above title to this paper on account of its general character, enabling me, as it will, to bring before you a great diversity of topics; and if I cannot offer you anything new, or of value, yet they will serve as the basis of subsequent discussion.

What I have to say on the several points touched upon, I do not wish to assert dogmatically, but merely give expression to an individual opinion, which opinion has, at times, been forced upon me by experimentation. I hold as a fundamental truth that, when mechanical results are required, mechanical means should be as far as possible resorted to, and the less our fingers have to do as means towards this end the better for our results. Automatic machinery always produces the most perfect work, yet we must recognize the necessity of a guiding mind wherever automatic force is exerted, and the perfection of work is, in a measure, in proportion to that guidance.

I do not think that any of us present to-day will live to see a gold plug introduced by automatic machinery, yet, if gold holds its present position as the best material for filling teeth, I think a generation will hardly pass away before this will be in some measure accomplished. We are in hopes, however, that before that time arrives, some other and better material than gold will have been introduced,—some plastic substance which will resemble the tooth in color and physical properties.

Probably the most skillful, as far as regards mere manual dexterity, are watch-makers, and yet it is now fully proved that machinery makes a better watch than was ordinarily done by hand, and we need look no further for a solution of this problem than is shown in this handicraft. At the present moment I suppose the best watches are made by the manual dexterity of a few highly-skilled artisans, which perfection of result has perhaps not yet been reached by machinery. I say perhaps, because I do not feel at all sure on this point, but am inclined to the supposition that in this case the most perfect work could be produced by the combination of the best skill with the most approved machinery; but as in all trades and professions the markedly skillful are but the few among the many, and as the great majority are not skilled, so hand-made watches cannot stand the competition of machine-made, inasmuch as not only the average machine-made watch is much better than the average hand-made, but they are much more uniform in quality, and can be made much more cheaply.

So in regard to the application of machinery to dental operations, granting, of course, that there are some marked differences in the surrounding circumstances. Indeed, there are some patients who will have no machinery about them, just as there are many who are prejudiced against anything made by machinery, from watches down to shoes. But the majority are not so; sensible people can easily be made to see what is to their advantage, and will submit with a measure of grace to our manipulation.

In considering the application of machinery in the introduction of gold fillings, we at once recognize that in the use of adhesive or non-adhesive foil the process of filling is materially different, consequently quite different applications are called for.

What I have to offer in this paper is an humble contribution towards the solution of this problem, so small indeed that it may well be considered as containing merely the suggestion of means whereby the time occupied in filling may be materially reduced, for we accomplish most when we can do the best work in the least time.

With your kind permission I will take up the several subjects in operative dentistry in the order in which they present themselves at the bedside, as doctors say: 1st. The preparation of the cavity. 2d. Adjustment of the rubber dam. 3d. Filling, finishing, etc. But, of course, you will understand that this order even is not imperative. Now, while I shall first consider the subject of excavation, yet there are many reasons why we might, with propriety, first take up the dam. In regard to this point allow me to state that, whether the dam is applied first or not depends in the main upon the operator's views of what deference is due the patient, and while I am perfectly willing to admit that the work can be more rapidly, less painfully, and perhaps more perfectly done with the dam *in situ*, yet, in many cases, the time required in excavating may be so spent that the patient may frequently change his position, or converse with freedom from restraint; consequently, where the time of the dentist is limited, where the dentine is particularly sensitive, apply the rubber dam first, otherwise not.

Preparation of the Cavity.

The first thing that naturally suggests itself under this head is, Of what value is the engine in excavating? It is of great value. I am on this question, as on all others, a conservative radical, and accept Paul's advice: "Prove all things, hold fast that which is good."

All cavities can be excavated without the engine, and this is just as true the other way; in fact, there are positions in the mouth that can only be conservatively treated by it, as the distal approximate cavities of the molars and distal buccal cavities of the same; but there is, on the other hand, produced by our natural conservatism, commonly called habit, too great a tendency to use the instrument when it is unnecessary, disagreeable, and less effective than the old time-honored tools; for example, the first work required in almost any cavity can be best done—that is, more rapidly and with less discomfort to our patient—when done with proper chisels, the enamel being, as a rule, more rapidly cut in this way.

But, on the other hand, the delicate, skillful touch of the expert manipulator is most fully brought out in the use of the engine. We have doubtless all excavated, with a fine bur- or diamond-pointed drill, points where our patients would not allow us to continue the use of the hand instruments; and the reason for this is plain, and the rule holds good all through. The finer the point the more rapidly it cuts, and with the least pain; consequently, the larger the point the slower it cuts in proportion, and the greater the annoyance to the patient.

All cavities should be prepared with five things in view: 1st. Regard to the proximity of the pulp. 2d. Regard to the permanency of the filling. 3d. Accessibility in preparation and subsequent filling. 4th. Loss of the least tooth-substance. 5th. Regard for the feelings of our patient. It is unnecessary for me to dwell upon the first point. On the second head, Regard to the permanency of the filling, very much might be said, but I will only mention that the necessity for the thorough removal of all *débris* other than over the nerve is only essential when it is considered advisable to fill with adhesive foil, and it is here where non-adhesive has an advantage. If the edges of the cavity are sound, the filling, from the very nature of its introduction, will be serviceable.

3. Accessibility. We all recognize the importance of this, and all means and appliances that will assist us in rendering more accessible and illuminating properly the cavity should meet with our approval. Allow me to call your attention to two silver mouth-reflectors which

Fig. 1.

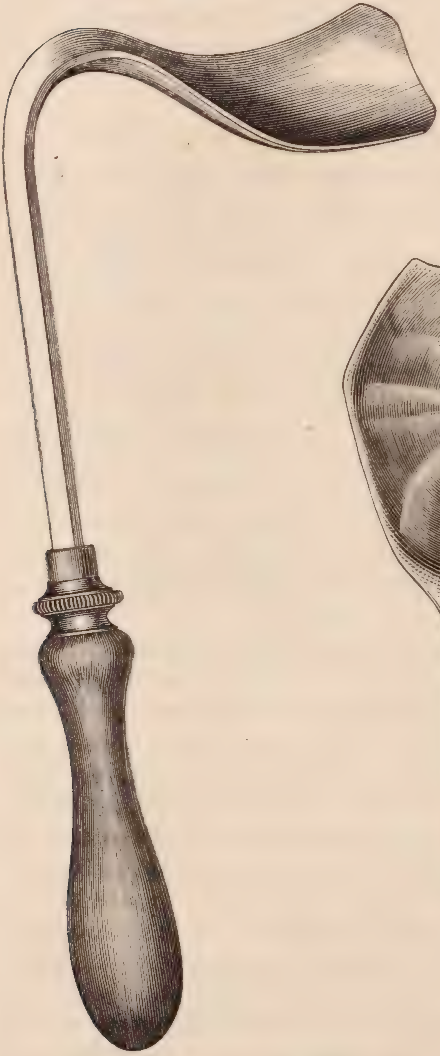
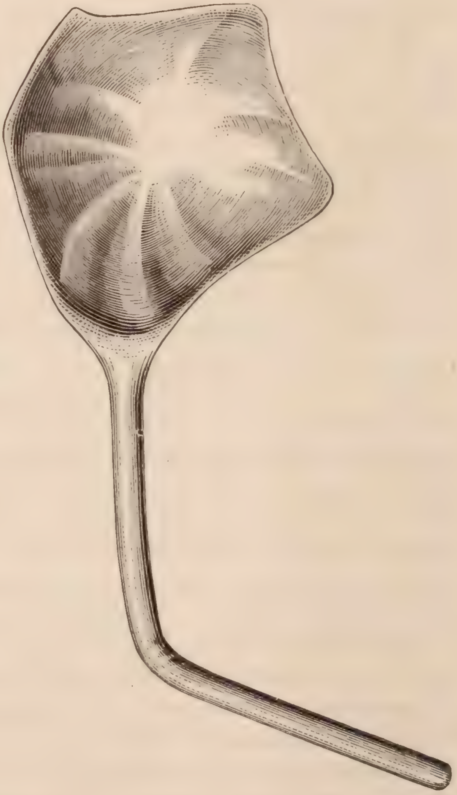
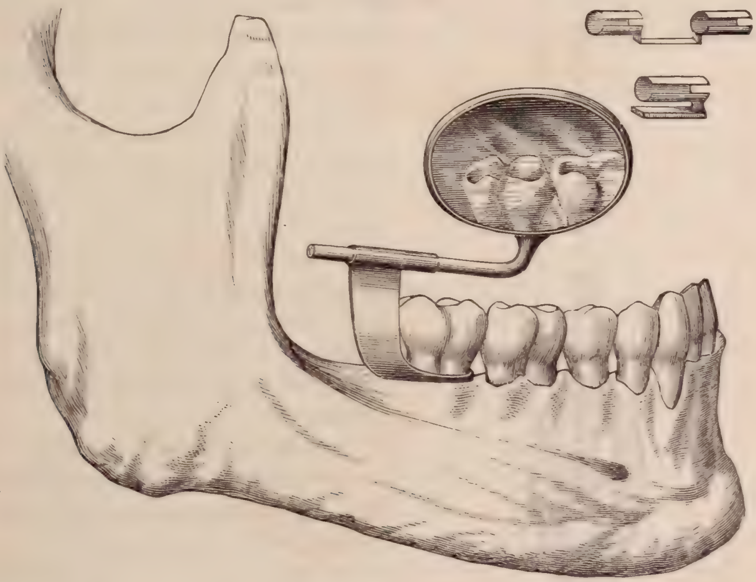


Fig. 2.



I have used for some years with great comfort (Figs. 1 and 2); they are intended one for each jaw, and are generally held by an assistant. There is a ball-and-socket mirror for attachment to the clamp sold at the depots, and it would answer an excellent purpose if it were made larger, oval, and with the socket sufficiently far from the clamp to enable it to be turned when required, which is not the case at present. I prefer one made as in Fig. 3. In the office of Dr. Visick, Brooke Street, London, there are in use two calcium lights, one for each operator; they are intended for use during the dark weather so common in that gloomy city, and in operating upon anterior cavities they must prove of much value. There is a small point that might be mentioned in connection with the second head, Regard to the permanency of the filling, and, although it is old and well known, it does not seem to be generally practiced,—*i.e.*, the beveling the edges of the cavity where adhesive gold is to be used. Now, there are two strong reasons why this should be done, because the pressure or blow is then directed against the edge of the cavity, although the instrument, as in packing the main portion of the filling, is in the direction of the walls; and again, the process of malleting the surface of the filling, or the pressure applied by hand, has a tendency to spread the surface into this counter-sink as a rivet is secured in a boiler. I would like to lay much stress on this matter, as it has more to do with the permanency of our work than we think. Of

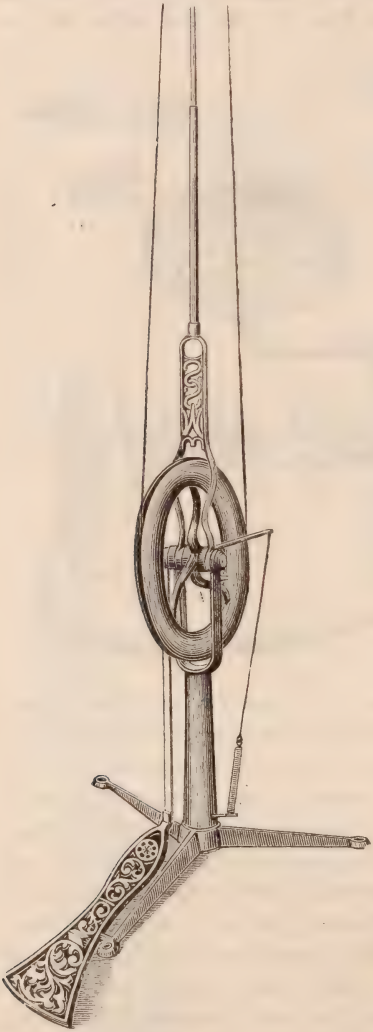
FIG. 3.



course, it is mainly recommended for that class of fillings which are placed *in situ* by forcible manipulations.

I would ask your permission at this point to make the following statement, and upon which statement I am prepared for adverse criticism. There is no operation known to surgery, not excepting any of the elaborate operations on the eye,—and most of them I have performed many times,—that compares in delicacy of manipulation, that requires so much skill and nicety of touch, as in many, I might almost say any, of the fillings which come under our daily observation. This is obviously so from the fact that, while in the one case the knife may vary from a given point a line, more or less, but the one-thousandth of an inch between a plug and the wall of the tooth is destructive to its permanency.

Fig. 4.



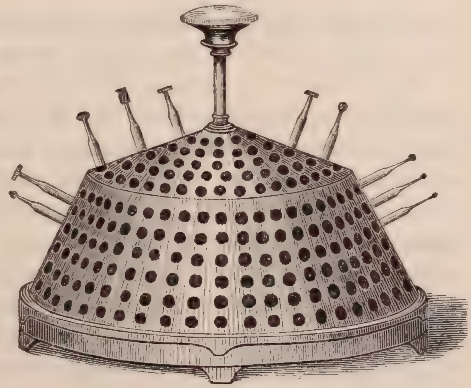
Before we leave the subject of excavation let us briefly consider the engines now in use; while the perfect one has not yet been introduced, yet we are gradually approaching that point. The objections to all forms of treadles have been in a measure overcome by the substitution of water and electricity, as in the Backus and Union motors. The former cannot be used in this city on account of the value of water, while the latter involves some trouble and considerable expense. Dr. Flagg, of Philadelphia, who uses the Union motor to run his S. S. White engine, etc., informed me that the running expenses of his battery amounted to some two dollars per week. Those of us who had the misfortune to invest in Green's electric engine have cause to regret the expenditure. With a view to overcome in a measure the bondage of the treadle, I would ask your kind consideration to a small modification of the S. S. White engine-treadle that I have used for some time, answering the purpose as it does perfectly. Its advantages are, that the feet are in the natural position, that the foot being over the center of motion, the motion is made equally by the heel and toe, consequently the vibration of the body is much less, the motion less fatiguing, and the treadle may be stepped upon without starting or stopping the engine. (Fig. 4.)

You will also notice that I have changed the spring of the standard by connecting it to a bar at right angles; this enables the standard to follow the motion of the hand quite readily, and without much resistance.

Although the S. S. White engine has some advantages, primarily its simplicity of appearance and its ability to run the disk well, yet, in at least one respect, it is inferior to the first style of Morrison engine, in that it offers a greater amount of resistance to movement. Now, while this resistance is less in the Morrison, I would call your attention to a device for relieving the hand of the weight of the connecting-bar, etc., which it accomplishes well, but has the misfortune to add to the complex appearance of this useful invention. The weight of the arm is relieved by a spring acting on a sort of traveler, whereby, when the arm is raised, the ring slides to the end of the wire, and in that position nearly sustains the entire weight, all, in fact, that is desirable; then, when the arm is lowered, the ring slides along the wire to the other end, thus relieving the tension of the spring when the engine is not in use.

Some years ago I made for and soldered to the corundum engine-points a cup of brass, to cover the nose of the hand-piece, and protect it from grit, etc. This answered the purpose well, but was a good deal of trouble to make. Swallow's tips might answer the purpose better if they were smaller, and prevented by a flange from being pushed away by the finger.

Fig. 5.



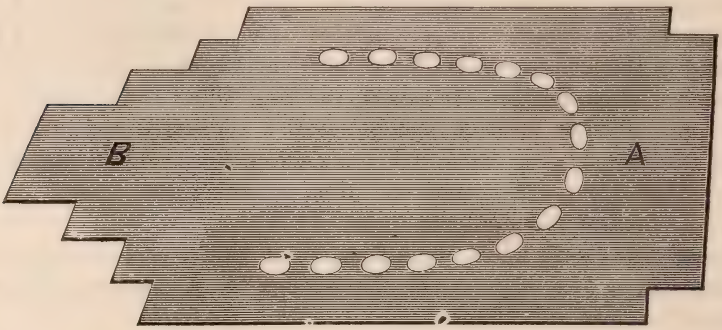
Allow me here to call your attention to a point-holder. (Fig. 5.) It is, as you see, a double cone in form, revolving around a center pin, which not only serves for a handle, but it contains a cup of oil, into which the points are dipped before placing them in the engine. The holder contains one hundred and sixty-three holes for long, and thirty eight for right-angle points, arranged, as you see, in divisions, as round-burs, wheel-burs, drills, etc. Let us now take up the next subject.

The Rubber Dam.

I consider that the true interests of the patient and the dentist are identical, consequently we should not only do the best work we are capable of, but should do it with the least pain and inconvenience to our patients. For this reason I invariably use the thinnest dam I can find, and would use it as thin again, if it were in the market. Which is more agreeable to our patients, a thick leathery gag or a light gossamer veil?

There are several ways in which the necessary holes may be made,—indeed, it is unimportant how they are cut, if they are well done; but there is a great deal of guess-work as to their location.

Fig. 6.



To overcome this I have made the guide which many of you have seen. It is merely a piece of sheet-metal or horn with holes punctured in it (Fig. 6), after the arrangement in the mouth. By placing this guide upon the dam the hole can be punched. With the assurance that it is in the proper position, and that there will be sufficient to properly cover the lip, and no more, this guide enables the operator to delegate to his assistant this work. I have made them in two forms: one to be held in the hand, and the other, for convenience, in a box containing the block of wood, punches, etc.

We have all, doubtless, experienced more or less difficulty in putting the dam on the back teeth where they are crowded together. There are several ways in which this difficulty may be overcome. Dr. Ingersoll, of Keokuk, Iowa, uses a metallic wedge, made of an alloy of nickel, some two inches long. This is gradually forced between the teeth while the operator is preparing the gold, etc. Others use wooden wedges for the same purpose, while others resort to the Jarvis separators. Dr. Brockway has said that no one should operate without a skilled assistant, and although it may be considered dogmatic, yet there is much truth in it,—so much indeed, that where one has experienced the comfort and value of this assistance, he will wonder how he was willing to work without one. By a skilled assistant the clamp can be readily applied, while the operator stretches the dam over the molar; but where there is no assistant—and probably not ten per cent. have such help—some other means must be adopted to meet the requirement. While in Japan, and when suffering under the disadvantage of unskilled assistants, I devised this clamp (Fig. 7); it has four little hooks, one at each corner; upon these hooks the dam is hung, and the dam, clamp, and all introduced together; the dam is then detached from these hooks. The objection to this, although I used it with comfort for years, is the same as with the Hickman double-lipped clamp: the difficulty of detaching the dam and the liability of tearing it. Recognizing this objection, I have made a new one on a different principle (Fig. 8). Having cut two holes in each foot of the clamp, two corresponding horns are attached to each arm of the forceps, and the dam hung over these horns, so that the act of releasing the clamp detaches the dam while *in situ*.

FIG. 7.

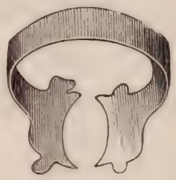
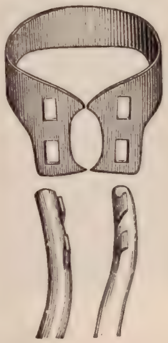


FIG. 8.

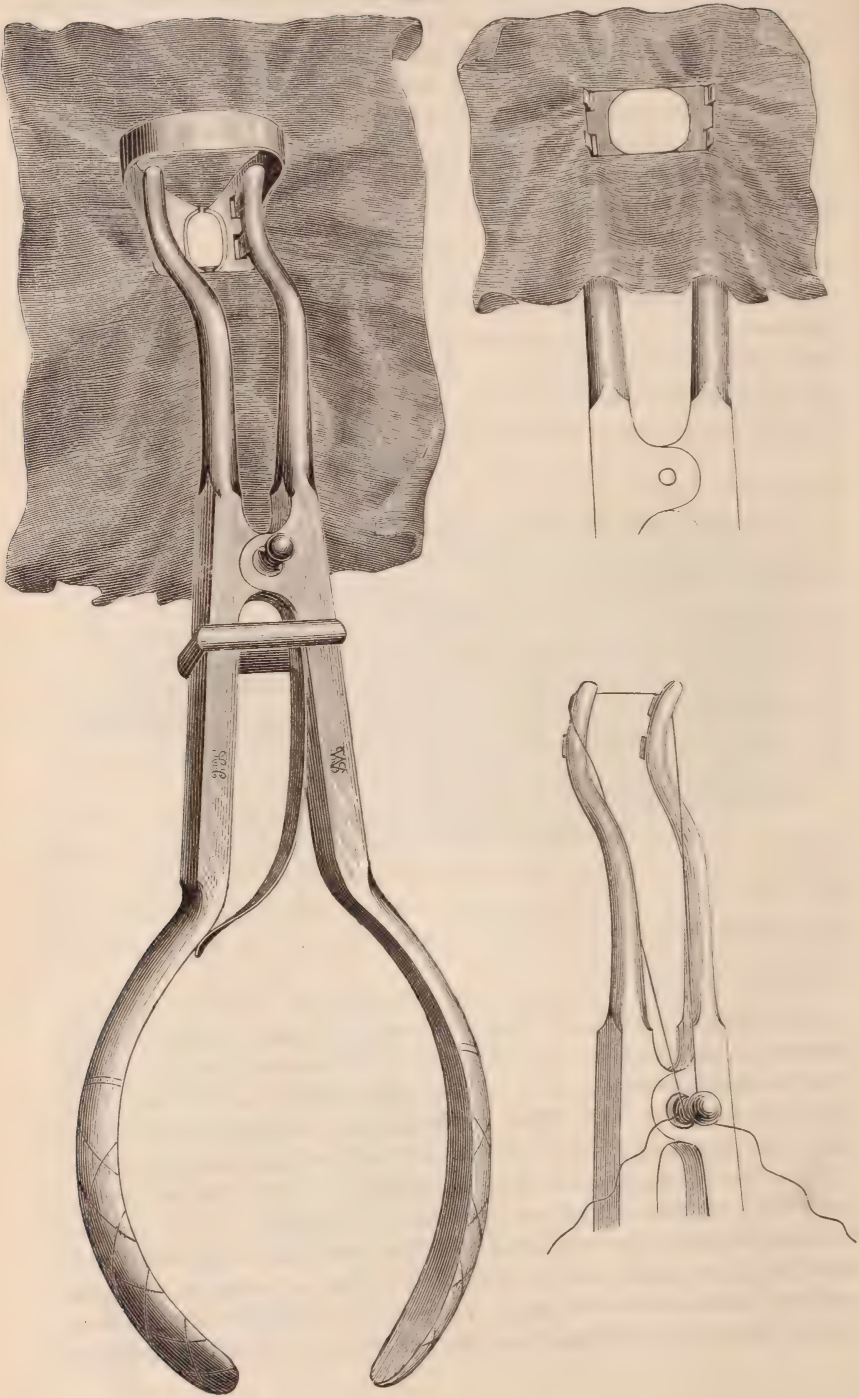


These forceps answer a threefold purpose: first, as ordinary clamp forceps; second, to apply the special clamp; third, to apply the silk ligature, taking the place of the forked contrivance commonly in use. Not only does the handle give you a much better grip, but by compressing the handles any amount of tension can be applied to the ligature. (See Fig. 9.)

While speaking of clamps, kindly allow me to call your attention to two other special forms; one for the wisdom-teeth, with the spring anterior to the jaws, intended for those cases where there is no room for an ordinary clamp, and the remaining one for buccal cavities of the oral teeth (Figs. 10, 11). They are intended to force the gum well up out of the way and to avoid the necessity of putting in a gold screw.

Now we will suppose the dam in position, the silk ligature around the teeth; we next attach our buckles and weights. I have been in the habit of using for some time a buckle that I like very much; for, while it is as simple as the Cogswell, it has an advantage in the readiness with which the dam is caught. The weights are attached to the dam by a modification of the same device, but the string is

Fig. 9.



made adjustable so that the weight may be placed in any position desired. (Fig. 12.) The objection to the Magill buckle is that it stretches from two given points on each side, which points cannot be varied to suit the requirements of the case.

Before commencing the operation of filling, the ejector is placed in position in the mouth. It has long been a desideratum to have some means of taking away the saliva as fast as it accumulates or as fast as it may be necessary. The several saliva-pumps in use are objectionable on the score of uncleanliness, with the exception of the Fiske, which, while fulfilling the indications, does so under certain disadvantages. It is too expensive; it requires a head of water; and it makes an unpleasant noise. All of these objections I think I have overcome. After much experimenting, having constructed no less than six different forms on the principle of Gifford's injector, I gave up that principle and adopted that of the old mercurial air-pump in use some fifty years ago, in which mercury is dropped through a slender tube; and as the drops act as cylinders with air between them, a constant exhaust is the result. As the result of these experiments I would offer you the following, consisting of a slender glass tube, some two or three feet in length, connected at the upper end to two rubber tubes, one for the water-supply, and the other leading up to the mouth of the patient. (Fig. 13.) As no force is necessary in the current, there is no necessity of a tank above; the only head necessary being that the water should merely flow into the tube. I have found that for the same current the suction is stronger than in the Fiske. Perhaps there is no greater objection to the dam than the accumulation and running over of the saliva; and although it may be urged that this objection is unimportant, yet why not remove an inconvenience so disagreeable to our patients? and although any ejector will do this, yet here, where we are supposed to be so radical, so prone to take up new things, there are but few in use. Dr. Visick, of London, informed me that his patients always asked for it; he considered it one of his most important appliances.

Before passing to the subject of Filling, let me here take up Absorbents and Cavity-Driers.

In 1870, while in the East, and noticing the fine fibrous character of some qualities of Japanese paper, I commenced its use for dental purposes, and have continued to use it up to the present, and have shipped from time to time large quantities to this country, so that now it can be obtained at all the depots. You will find in its use the following advantages: it is the best absorbent of moisture now in use; being markedly fibrous in character, it is the strongest material when twisted into a fine thread and packed into the nerve-canal, as it may readily be withdrawn without breaking. Not being elastic

Fig. 10.

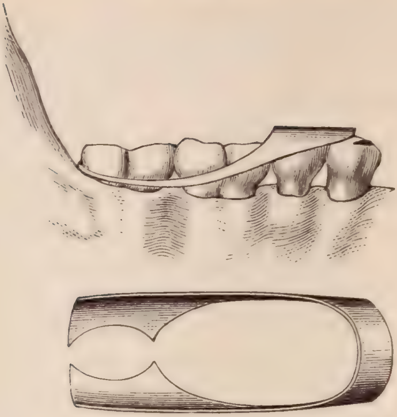


Fig. 11.

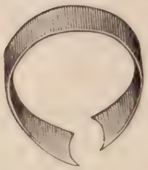


Fig. 13.

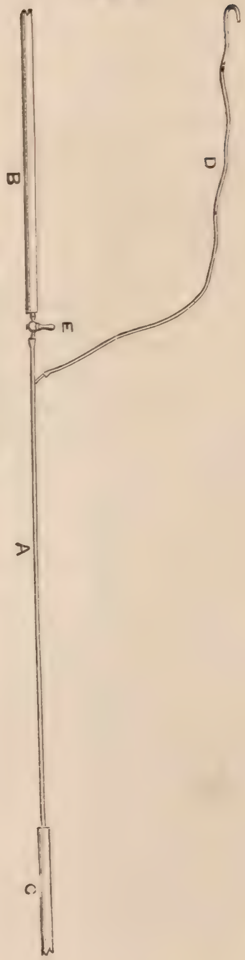
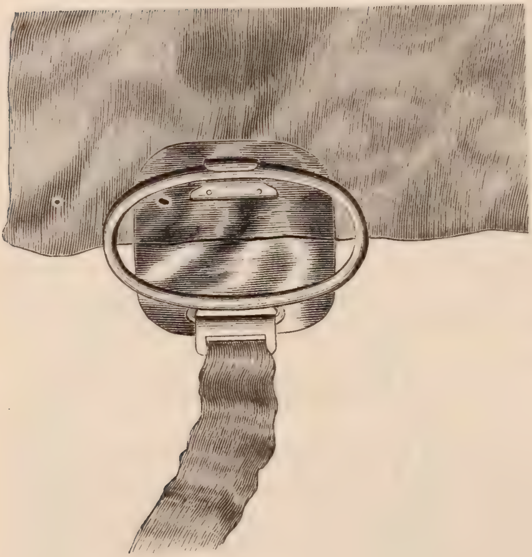


Fig. 12.



like cotton, it may be wound tightly around a fine probe and passed into the canal. I find it also very useful in stopping a leak in the dam, or in absorbing moisture that sometimes exudes through the torn edge of the hole. I have often successfully, and without difficulty, completed an operation that would otherwise have necessitated the removal of the dam.

That you may not have to accept my mere statement as to the value of this material I have performed the following experiments:

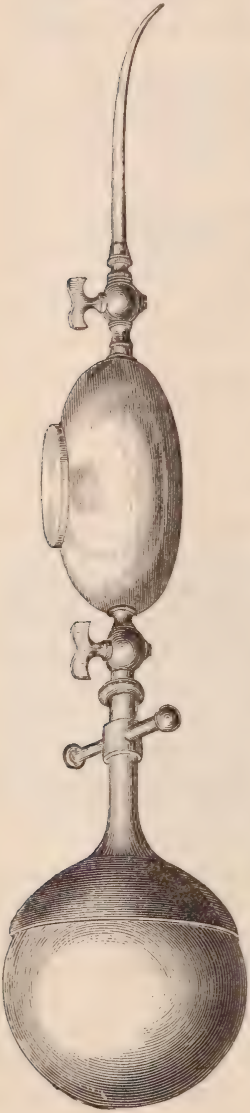
After procuring specimens of the several absorbents most in use, I weighed out a given amount of each in grains; then, making them all of equal length and thickness, I immersed them for a given time to the same depth in a watch-glass filled to overflowing with water; then they were taken out, weighed, and the comparative increase in weight gave the comparative powers of absorption. The result was as follows:

Prepared cotton	absorbed	in	1	minute,	1	grain	of	water.
Spunk	“	“	1	“	1	“	“	“
Spongoid	“	“	5	seconds,	2	“	“	“
French bibulous paper	“	“	5	“	4½	“	“	“
Japanese paper	“	“	5	“	7	“	“	“

There are several kinds of cavity-dryers or hot-air syringes in use by the profession. Taft describes one of the earliest in his work on Operative Dentistry. Moffatt's has been long and favorably known, and S. S. White has more recently introduced one. In experimenting with the Moffatt several years ago, I found that it would evaporate a given amount of water in half the time if the bulb was filled with fine copper wire. I also designed several new forms: one in which a flue was carried across the bulb, at the mouth of which flue the flame of the lamp was held. I found, however, that it was constructed on entirely too large a scale, it being impossible to properly heat the air in the limited time desired. I then had one made on the reverse principle, containing a minimum of air, with a worm instead of a bulb, which worm is heated by the alcohol lamp. This I find answers the purpose well. My experiments in this direction led me to the disagreeable discovery that my time had been almost wasted; for I found that no bulb, worm, or equivalent is necessary: that if the flame of the alcohol lamp is drawn into the tube by suction, the result is just what is desired, for, although the vapor of alcohol is thus taken into the syringe, yet for practical purposes the result is the same, as the vapor instantly evaporates.

By actual test one grain of water was evaporated by the S. S. White syringe in 75 seconds; by the one with the worm in 25 seconds, and by the common bulb water-syringe in the same time. My experiments with chloride of calcium were not very successful on account of the rapid deliquescence of the material; but I find it advertised in Ash's Catalogue, in the form of a bulky contrivance like a foot-stove, with a bellows for the foot and a tube leading upward to the patient. I would suggest, however, if there is any occasion for its use, which I doubt, a syringe somewhat like the Moffatt, with a screw-cover to the bulb and a faucet on either side, so that after use, access of the air might be prevented. (Fig. 14.)

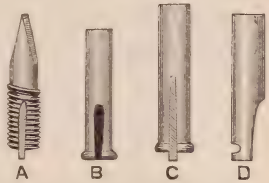
Fig. 14.



Finally, let us take up in a brief and exceedingly imperfect manner some points in the filling of teeth. Now, what indication do we fill, and what is the order of their importance?

First, to give greatest permanency to our work, and, second, with the least possible pain and inconvenience to our patient at the time of operating and during the subsequent career of the tooth. Consequently a judicious operator will use such material as will in his opinion best answer the requirements of the case, whether it be gold, tin, amalgam, or something else. For example, no wise dentist would build up a broken-down molar with gold when the condition of the root is involved in doubt; neither would the careful operator contour a filling if anchorage was in anywise uncertain. Personally, I would go further than that, and say, when I go much outside of the cavity I prefer something more reliable than the uncertain adhesion of gold foil in my retaining-points; either use narrow strips of heavy foil, not less than No. 60, from the bottom of your retaining-pit, and subsequently carried into the body of the filling, made commonly with a much lighter foil, or, where it is desirable to give still greater security, a screw may be inserted; or, what I often prefer, pins made after the following plan: one is made like an ordinary brass pin—with part of the head-shank filed away and cut the necessary length; a hole is made in the tooth, which is subsequently countersunk with a wheel-bur; the pin is inserted, pushed to one side, and the remaining hole filled with foil. This plan gives you a strong, stiff pin that cannot work loose, while it also furnishes the retaining-point to start the filling. There are several ways in which split pins may be used with profit. A good form is to split through the head, placing a small wedge in the slot. This wedge comes in contact with the bottom of the cavity and is pressed into the slot, and thus forces the head into the countersink. Screws can be made in the same way, or an open cylinder with a flanged head, which can be sprung into the countersink and held *in situ* by foil, or a pin put into the cylinder through its open end. (Fig. 15.)

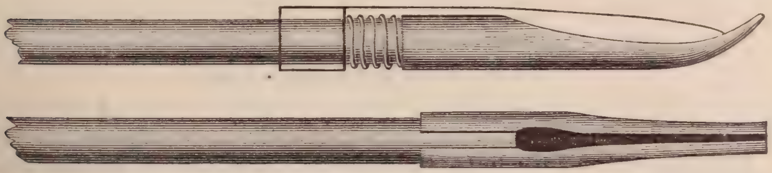
FIG. 15.



These pins are not intended to take the place of the screw, although there are many places where it would be preferable. They are easily made by any one, not requiring any special instruments either for their manufacture or introduction; they will be used by many who do not keep the screws on hand or to fill other indications. The screw, to be effective, requires to have a comparatively deep hole, well tapped, which, with the ordinary hand-instrument, is most difficult, and the screw must fit just so tight; if more than sufficient it is liable to split away a piece of the tooth, and if too loose it is almost useless.

In the filling of teeth with foil I have nothing to offer you; while all the varied forms are useful, I am personally inclined towards the ribbon, as it is at least one step towards the solution of the problem of the rapid introduction of adhesive gold. I anneal the entire ribbon by drawing it through the flame; then, placing it in a tube, draw it therefrom as fast as may be desired. I use one for rope, one for heavy No. 60 strips, and one for No. 2. One of the tubes is made to force the gold out as required, while the others are adapted to its withdrawal by the point of the plugger. (Fig. 16.)

FIG. 16.



(To be continued.)

MEETING OF THE ALUMNI OF THE MARYLAND DENTAL COLLEGE.

The annual meeting of the Alumni of the Maryland Dental College will be held in the lecture-room, on Friday, March 8th, 1878, at eleven A.M.

C. E. Busey, *Recording Secretary.*

ERRATUM.

In the abstract of a report on therapeutics in the December Dental Cosmos, page 636, thirteenth line from the top, the word *hypophosphate* should be *hypophosphite.*

EDITORIAL.

A NOVELTY DEPARTMENT.

The First District Dental Society, whose monthly clinics at the dental depot, corner of Broadway and Ninth Streets, New York, have proved so interesting and instructive, has instituted a "Novelty Department," and placed it in charge of Dr. W. St. George Elliott. A general invitation is given that all new inventions and appliances, with descriptions of new modes or processes relating to dentistry, be forwarded to Dr. Elliott, care S. S. White, above address.

Dr. Elliott will take pleasure in exhibiting and explaining the same during the clinic on one or more occasions.

BIBLIOGRAPHICAL.

Condensed Proceedings of the New Jersey State Dental Society for the Years 1875–6–7. Publishing Committee: C. S. Stockton, Charles A. Meeker, J. W. Clark.

Transactions of the American Dental Association at its Seventeenth Annual Session, held at Chicago, August 7th, 8th, 9th, and 10th, 1877. Elgin, Ill.: C. Stoddard Smith, Publisher, 1877.

Transactions of the Twenty-second Annual Session of the Michigan Dental Association, held at the Dental Department of the University, Ann Arbor, October 9th, 10th, and 11th, 1877. Published by order of the Association. Ransom & Randolph, Toledo, Ohio.

TRAITÉ DES ANOMALIES DU SYSTÈME DENTAIRE CHEZ L'HOMME ET LES MAMMIFÈRES. Par LE DOCTEUR E. MAGITOT, Lauréat de l'Institut, de la Faculté, de l'Académie de Médecine; Membre de la Société de Chirurgie de Paris.

TREATISE UPON THE ANOMALIES OF THE DENTAL SYSTEM IN MAN AND ANIMALS. By DR. E. MAGITOT. With an Atlas of twenty plates, designed and engraved by E. Nicolet. Paris: G. Masson, 1877.

This handsome volume of three hundred pages is the most elaborate and scholarly essay upon the subject that has yet appeared; it is indeed exhaustive of the whole subject of dental variation and malformation. The author has not confined himself to his own observations, but has embraced the results of the labor of others. The work is divided into nine chapters and a general introductory essay. To a great extent the work may be considered a study in teratology. His method is essentially the same as that employed by classical French writers, such as Isidore Geoffroy Saint-Hilaire, M. Davaine, and others.

Each of the chapters is devoted to a special topic:

1. To Anomalies of form. These comprise the modifications in the form of the tooth, and either embrace the entire tooth-structure or are confined to the crown or the root.

2. Anomalies of volume. These are of two orders: augmentation of the normal volume, or *géantisme;* diminution, or *nanisme.*

3. Anomalies of number. These present three varieties: congenital absence, numerical diminution, and augmentation.

4. Anomalies of position. These are divided into three groups: simple transposition, heterotopy* by migration, and heterotopy by genesis.

5. Anomalies of direction, comprising four classes: retroversion, anteversion, lateral inclination, and axial rotation. The practical interest which is associated with these anomalies relates to the fact that the great majority of them are curable.

6. Anomalies of eruption. These include the accidental disturbances in the order of eruption and succession of teeth. Thus we have precocious eruption, retarded eruption, precocious loss, retarded loss.

7. Anomalies of nutrition. These comprise all the functional disturbances attacking the nutrition of the tooth during its formative stage. They may include the entire organ, or be confined to one or more of its tissues.

8. The anomalies of structure. In this group are included all

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* Heterotopy, out of place.

alterations of an anatomical description situated in the different dental tissues; they are either general or limited, according to the nature of their producing cause, and determined by the time and the duration of their appearance.

9. Anomalies of arrangement. This last division includes a certain number of deviations from the normal standard, comprising amalgamation by anomalous division and a variety of troubles incident to deformation of the jaws.

The author assumes that the typical form of the tooth is conoidal. After reverting to the characteristic features of teeth in fishes, he passes in succession to the different classes of animals, making general remarks upon the number of teeth in animals, notably those of the quadrumana. In speaking of the diastema, he remarks that this peculiarity does not imply necessarily the suppression of the canine, since it is found in the greater number of mammals; and that in the upper jaw it is situated between the canines and incisors, and in the lower jaw between the molars and the canines.

Under the head of the anomalies of the dental system, as considered in the human race, he treats of two different phases of the subject:

1. The relations existing between the teeth of primitive and recent man.

2. The variations occurring within the teeth of modern man alone.

It has been reported that in the teeth of some fossil men a fifth tubercle has been found upon the upper molars, as well as a fifth root to the inferior wisdom; the root of the inferior canine bifid, while the diastema is present.

M. Broca has observed the difference in the type of the Egyptian people with respect to the shape of the nose. It is found modified in form after the first Ethiopian invasion; but nothing beyond this analogy would seem to imply that any dental variations followed. The author quotes freely from Mr. Mummery with respect to the dental variations in ancient skulls, which go to prove that dental anomaly was as frequent formerly as at the present time.

An interesting section is devoted to the relations existing between dental anomaly and active morbid processes; thus, their serving as the exciting causes of cysts, ostitis, fistule, etc. Nor is the subject of anomalies as they occur within dermoid cysts neglected; and that strange phase of development by which teeth and hair are found well developed in localities where no such organs normally appear is thoroughly considered.

Under the head of anomalies of volume are discussed the malformations due to disease, notably those presumably excited by constitutional disease.

Elaborate tables of dental formulæ are presented, indicating not only the changes in the permanent dentition, but also those of the deciduous, and giving likewise a detailed account of the number of the teeth in mammals.

Enough has been indicated of the character of this valuable work to justify the remark that, if it may be said to be in any way imperfect, such stricture should be limited alone to the fact that not enough attention has been given to histology. This omission is especially noticeable in the chapter on anomalies of nutrition, which, while dealing almost exclusively in material of a semi-pathological character, is not illustrated with a single figure of microscopic structure, notwithstanding the fact that the entire language of the text is based upon the modern classification of diseased action, which necessitates for its correct appreciation minute anatomical knowledge.

The plates are handsome lithographs, each containing from one to twenty-seven figures, accompanied with a very full table of description and explanation, and not unfrequently figuring apparatus designed to correct malplaced teeth.

The large number of two hundred and seventy-four figures in all illustrate this elaborate study. It is in every sense authoritative, the author being known as the most industrious and voluminous living writer on the subject. H. A.

OBITUARY.

DR. GEORGE T. BARKER.

Died, of typhoid fever, January 10th, 1878, George T. Barker, D.D.S., in the forty-second year of his age.

Dr. Barker was born in Poughkeepsie, Dutchess Co., N. Y., March 26th, 1836, where he spent his youth and received his early education. At the age of nineteen he removed to Baltimore, Md., and commenced the study of dentistry with Dr. Samuel Townsend, with whom he remained a year or more. In the year 1856 he removed to Philadelphia, and became an office-student with Dr. Edward Townsend. He attended lectures at the Pennsylvania College of Dental Surgery, and graduated from that institution in 1859; was elected professor of Dental Pathology and Therapeutics in the autumn of 1862, which position he occupied until the time of his death. He was elected Dean of the Faculty in March, 1876, which office he retained until March, 1877.

Dr. Barker was one of the original editors of the *Dental Times;* was the author of a work entitled "Instructions in Nitrous Oxide;"

was a contributor to the various dental journals; was a member of the American Dental Association, a member of the Pennsylvania State Dental Society, a member of the Pennsylvania Association of Dental Surgeons, etc. On the 26th day of April, 1860, Dr. Barker was united in marriage to Susan Ridgway, daughter of Thomas Ridgway, Esq., of Philadelphia. A son and daughter survive him as the result of this union.

Dr. Barker was a member of the Society of Friends, and also belonged to the order of Masons.

Ourselves marching to the eternal world, it is but fitting that we loiter for a moment on the busy highway of life to record the virtues of our fallen comrade.

Dr. Barker was a man of positive character, and, like all men thus constituted, his likes and dislikes were easily recognizable and his motives liable to be misunderstood. Yet a prolonged acquaintance assured one of his frankness of disposition and his willingness to make suitable amends where wrong impressions had been conveyed.

He was a zealous worker in his profession, ever ready to defend its dignity and aid its advancement. As a teacher, he was able, conscientious, and popular, and for fifteen years was instrumental in perfecting young men in the branches which he taught with more than ordinary ability.

As a practitioner, he was successful, enjoying the confidence of many, and securing to himself a large and lucrative practice.

As a citizen, he was loyal and brave, frequently defending in public the rights of the oppressed, and seeking to alleviate the sufferings of the unfortunate. For years it had been his practice to spend evenings in our city hospitals and institutions of charity, reading and reciting popular stories for the pleasure and entertainment of the inmates. Eminently social in disposition and lively in manner, he attracted to himself a large circle of friends and acquaintances, who will profoundly lament his untimely death.

If I may venture to enter the sacred precincts of home and speak of him as husband and father, it is in that capacity that his character shone forth with greatest brilliancy. Dr. Barker's home-life was beautiful. When he crossed the threshold of home he dropped the cares and perplexities of business and entered into joyous sympathy with wife and children. His social instincts made him a companion to his family, by whom his untimely removal will be most keenly felt.

E. T. D.

HINTS AND QUERIES.

"He that questioneth much shall learn much."—BACON.

CORRESPONDENTS desiring a reply in this department are requested to make use of *distinctive signatures or initials,* and avoid the practice of signing their communications Reader, Subscriber, etc.

CORRESPONDENTS who wish notice to be taken of their communications should authenticate them with their names. We cannot insert queries or replies except they are so accompanied. Names not necessarily for publication.

I ATTEMPTED to replace two teeth on a celluloid plate. After preparing the plate and placing the teeth in position, I filled the place with celluloid reduced to a pulp by putting it in strong camphor-water, saturating the edges of the plate with the same. After closing the flask I put it in the bath, using glycerin. On opening the flask I found the plate and the material put in to mend the same soft. I added more material. When I next opened the flask a part of the plate had melted and run out; that which remained was as friable as clay, and perforated with innumerable little holes.

I have worked celluloid for nearly six years in the same way. This is the first case of the kind I have had. Will some one explain the cause?—J. B. TULLIS.

A YOUNG man came to me a short time since to have me fill a second inferior molar. On examination I found the tooth lifeless; decay had reached the pulp-cavity. I tapped the tooth with an instrument, and not finding any disagreeable sensation, I considered it a fit tooth to fill.

The cavity was properly excavated, but as the nerve-canals were entirely too small for the finest broach, I simply filled the pulp-cavity with cotton dampened with carbolic acid, and on that inserted an amalgam filling, and discharged my patient. In about four hours he experienced most intense pain, and, as I was not to be found, he had it extracted by a neighboring doctor.

What was the trouble in this case?—H. C. H.

MRS. Z. sought my services to whiten a discolored lateral. It was very dark in color, and of course I diagnosed a dead pulp as the cause. I proceeded to open into the pulp-cavity through the cavity of decay, which, by the way, was deep. I was surprised to find the dentine exceedingly sensitive, so that the *least* touch of the instrument caused intense pain. I concluded to defer the whitening operation till some future time.

If any one can advance a reasonable theory to account for this state of things, I should be glad to hear from him.—P. E. W.

A YOUNG man twenty-one years of age has irregular incisors. The cuspids and bicuspids need expanding, or rather the *arch* needs expansion to make room for the incisors. The centrals and one lateral need to be shoved outward and slightly rotated in order to bring them into correct position. No interference as to the articulation of lower teeth. The irregular teeth will have to be moved considerably to make the operation a success. His teeth are solid, and almost irresistible to pressure.

My question is this, Is my patient too old to have this regulating accomplished successfully?

I think the Farrar system of regulating teeth is the best thing out, but what would Dr. Farrar do with this patient?—I. P. W., *Burlington, Iowa.*

I WILL thank any one who will inform me of the best treatment for that exceedingly annoying and stubborn affection, hyperæsthesia of the cementum along the free margin of the gum. I have now such a case, which has resisted all my efforts to correct. Sweets, acids, and salts occasion great distress, and the touch of an instrument to these portions of the teeth gives exquisite torture.—M. P.

WILL some one please inform me how to replace a tooth on a celluloid plate which has been worn without changing the color of the plate?—CELLULOID.

WE are often cautioned against the extraction of teeth for a pregnant woman for fear of the shock causing miscarriage. I would like to know if such a result is really to be feared, and if it has happened in any considerable number of cases.—J. B. W.

REPLY TO G. W. I. S., who does not seem to have noticed the difference between *treating* and *curing*. The assertion was that any one who does not know how to *treat* an alveolar abscess ought not to call himself a dentist. G. W. I. S. assumes that the writer meant that any one who does not know how to *cure* an alveolar abscess ought not to call himself a dentist. Between a recognition of the principles involved in the treatment of any given case and the ability to insure a cure there is a very marked difference. The writer does not know any better method of treatment than that pointed out by Dr. Flagg in one of his earlier papers of the series now being published in the DENTAL COSMOS, and the suggestions of Dr. Farrar in a recent number of this journal.—O. I. C.

ANSWER TO S. R. D.—I observe two or three answers to your inquiry about the best plates for the lower jaw when there is much absorption.

Some recommend very heavy metallic plates, etc. I protest against this for two reasons: 1. The absorption is rapid enough without being greatly increased, as heavy plates will do. 2. They are very unpleasant to wear. I might give as a third reason that the weight will do but little, if any, good in holding the plate down.

I wear a lower plate where the *bone* (the alveolus has been gone for years) is greatly absorbed, and my plan is to have the plate very thick and broad on the outside of the molars and bicuspids, so that the muscles of the cheek will help hold it down when they become tense, as they do in masticating. Also on the inside concave it all around considerably, so as to give room for the tongue and to make it tight.

I much prefer gold next to the membrane. My plate lies so steadily as not to let a fig-seed under it generally in eating, and the suction is greater than that of the upper plate.

I take an impression first in wax and then in plaster, with moderate pressure in the latter.—J. N. HODGEN, *Woodland*, *Cal.*

REPLY TO FRANK H. BRIMMER, IN NOVEMBER DENTAL COSMOS.—You know not what you say. Amalgam should never enter a tooth. There is quicksilver enough in one large amalgam filling to answer for medicinal purposes for the homœopathic world, for maybe as long as the filling might last, and enough under certain circumstances to cause the loss of the entire set of dentures from the mouth into which it is placed.

Mercury is the great antidote for syphilitic poison. When placed in the mouth it may produce any or all the symptoms which it is a medicine for. It may not always cause the symptoms; it may lie dormant, but that depends upon conditions of which we know nothing. The secretions may never touch it; they may act upon it to-day, and not to-morrow; or they may unceasingly take hold of it until the whole system is so charged as to produce any or all of the symptoms mentioned. So it is beyond human power to previously conclude what harm may arise from the use of amalgam.—D.

ANSWER TO A. W., IN NOVEMBER DENTAL COSMOS.—Dr. Dennett, of Gloucester, Mass., claims that it is the coloring matter (hematine) of the blood from the wounded gums that causes most cases of discoloration of gold fillings. I think if you use gold that will not discolor if melted in the flame of a spirit lamp, pack, and finish with clean instruments used only for gold, and keep the work free from blood, you will have little or no trouble. Of course fillings may become discolored from powerful medicines or from amalgam.—D.

REPLY TO HENRY C. STONE.—In the first place, you do not use your plaster thick enough. You need it as thick as it can be worked, and have it fill all the cavities around the teeth when imbedding. The trench should be within one-eighth or one-sixteenth of an inch of the teeth, and cut slanting, so that the edges will not break down. Use the steam apparatus and follow these directions, and you will have no trouble. The cast should be oiled with sweet oil and soapstone. I have used celluloid for the last four years, and think there is no other base equal to it, especially in its acceptability to the mucous membranes.—H. P. MARTIN, *Detroit.*

ANSWER TO DENS, AND A REPLY TO DR. BLACKSHAW.—In view of the fact that nine-tenths of the patients found in a country practice will not pay for gold, we, the country dentists, must use such materials as we can get paid for. Rubber seems to be the most used, but I regard any weighting-down process as unsatisfactory, especially after impressions taken, as I judge the great majority are.

I use a shallow tray, not to exceed three-eighths of an inch wide, and barely concave. This being fitted to the gum as nearly as possible by bending with the fingers, a roll of soft wax, less than half an inch in diameter, is laid on the tray. It will adhere readily if the tray is slightly warmed; with this take an impression as accurately as possible. This impression is to be trimmed until it is about the shape of the tray, when it should be spread perceptibly all around. Into this put your plaster, mixed with about a teaspoonful of saturated solution of salt and water, with enough water added to thin it properly; put it carefully into the mouth; push the cheeks out with the finger to draw out any folds of membrane, and settle it, first back then front; hold it there with the index-fingers, the thumbs under the chin, and immediately direct the patient to raise the head erect, and stick the tongue into the roof of the mouth, then out over the tray toward you, just previous to the plaster setting. This gives you the impression of the process alone, the muscles of the floor of the mouth rising up and crowding the plaster away, and making an impression of their attachment. File up as usual, being careful to file away as long as there is a fan-shape to a muscle. You then have a simple case where the teeth will not rise up in talking, because the plate is comfortably out of the way of the muscles of the floor of the mouth, and you have a plate with the one essential of all successful plates, a good fit, rendering any weighting-down process unnecessary, and avoiding the sound so often heard in articulating, owing to a misfitting plate.

I agree with Dr. Steere as to being unable to weight down a muscle in the mouth; do not think it can be done without impairing speech.

Give these muscles sufficient room and a fair chance to perform the functions for which they were intended, and they will not interfere with your plates; but if you encroach upon them they will let you know it by the annoyance they will cause your patients.—A. J. G.

Answer to the query from the pages of the *British Medical Journal* and Dental Cosmos, October, 1877, "How to prevent the shedding of the hair and teeth?" The question may be answered in one word—"Friction."

Dentists are all familiar with the fact that if the gums get sufficient friction, either by mastication or the brush, to keep the teeth free from tartar and the gums in a healthy condition, the teeth *will not become loose and fall out.*

The same may be said in regard to the hair. If the head gets friction sufficient to keep the scalp free from dandruff, as also the roots of the hair in a healthy condition, the hair *will not be shed.*

It will require but a little observation to explain the reason why the hair more commonly falls from the top of the head than from the sides. The sides and back part of the head receive constant friction in contact with the pillow at night and by wearing the hat by day, while the top of the head gets very little friction either by night or day.

Hence, if the lower incisor-teeth could have the same amount of friction that the other teeth and gums do, they would not be the first to be shed, and a daily vigorous brushing of the scalp would in time do away with so many bald heads. —A. F. Davenport, D.D.S., *North Adams, Mass.*

C. W. P., a merchant of this place, has been wonderfully afflicted with sore mouth for several years. Physicians generally after failing to relieve him attributed the cause to a rubber plate which he wore. I made him a celluloid plate. Since wearing it his mouth has got entirely well.—H. W. Conley, *Sulphur Springs, Ohio.*

How to make Corundum Slabs for Polishing Fillings.—Gather the broken pieces of corundum wheels or slabs which you may happen to have and place them upon a smooth, flat surface of iron, brass, or marble. Place the same upon the stove and allow it to become just warm enough to soften the pieces of corundum. Then, with a table knife, form into an oblong or square, flattening it down, say to one-eighth of an inch in thickness. Now allow it to cool and transfer it to an ingot without raised sides. Put on the screw compress and set the ingot on the stove until the corundum slab is softened sufficiently to yield to the pressure of the screw. Reduce it by pressure to say one-sixteenth of an inch in thickness. Then place it in cold water and remove it from the ingot. Lay it again upon a warm, smooth surface, and divide it into such shapes as may be desired. It will readily divide while warm by pressure with the edge of a knife-blade. Wedge-shaped pieces, so useful in dressing approximal fillings, can be formed by pressing the blade of a pocket-knife upon one edge until it is very thin. Any variety of shape can thus be made and subsequently dressed upon a grindstone or corundum wheel. Then place one edge or corner of the piece in a delicate flame, and when slightly softened grasp it with the jaws of a porte polisher and slip up the collar. This indents the piece so that it is held firmly in the porte polisher.—E. C. Ford.

A Suggestion.—Take the ordinary "wood polishing points," coat them with a solution of gum shellac in alcohol, then sprinkle them with pulverized corundum and allow them to dry and harden. They will be found *very* useful in finishing gold fillings and removing superficial decay.—I. H. Alexander, D.D.S., *Columbia, S. C.*

THE

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ORIGINAL COMMUNICATIONS.

DENTAL PATHOLOGY AND THERAPEUTICS.

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[Entered according to Act of Congress, in the year 1873, by J. Foster Flagg, D.D.S.,
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(Continued from page 79.)

Symptoms of exostosis.—The diagnosis of dental exostosis is a matter of exceeding difficulty, and is only to be made, even *approximately*, by the aid of one or two things, viz.: very extensive *experience in practice*, or the most thorough possible study of every other dental disease, that by this means a "differential" diagnosis may be made.

Even by these methods, it is impossible *positively* to determine the existence of *exostosis*.

Like the presence of pulp-nodules, which can only be decided positively by actual proof, through devitalization of the pulp and extraction of nodules, or, again, like the absorption of the roots of permanent teeth, which can only be positively ascertained by extraction of the teeth and careful subsequent examination, the actual existence of dental exostosis can be proven only by examination of the suspected tooth after extraction. And yet some idea may be formed of the *probabilities*, and some plausible foundation for the hope of relief may be attained.

If the pain from dental exostosis is *localized* in immediate proximity to a tooth, the diagnostic peculiarity is that of a dull, gnawing, uneasy sensation, referable to the suspected tooth,—a pain which is not absolutely persistent, but which is, on the contrary, even decidedly remittent, and even intermittent, but which does not usually have *periodicity* as one of its intermittent peculiarities, but which *may* have even this under the *so-called* malarial influences.

This pain never has the decidedly paroxysmal *acuteness* of pulp-irritation, and usually, when paroxysmal, has decided *length of duration* instead of intensity; thus, pulp paroxysms generally last from an *instant* to an hour or two, having for their *average* about *half an hour*, while exostosis paroxysms last with *sufficient severity*, but with *no agonizing intensity*, for from one or two hours to twelve or fourteen hours, and sometimes, with more gentleness, for a day or even two days. In rare cases there is *constantly* more or less uneasiness, never very severe, but always a disagreeable knowledge of the presence of the tooth.

In such cases as these it is usual to find no signs of trouble in gum tissue, there is little or no tenderness on pressure upon the gum; there is, however, almost always a recession of the gum tissue from about the neck of the tooth, a denudation of the roots for a greater or less distance, but sufficiently marked; but this same condition is even more frequently found in cases where no exostosis exists, so that I fail to be able to attach positive importance to it. It has only *possible* connection with existing trouble.

It is usual, however, to find some response to pressure upon the tooth,—not any decided pain or increase of pain from pressure, but a *difference* quite perceptible between this and the other teeth. About the same proportionate difference results from moderate blows.

Hot and cold applications produce a like peculiar *response*,—nothing like intense pain, but a *decidedly different* sensation from that produced by the same applications to other healthy teeth of the patient.

The *gradual*, *very gradual*, increase of the uneasiness, and the *great length of time* during which this gradual increase is developing, is one of the most certain diagnostics of dental exostosis. This is *never* for a less period than several months, and it is usually during a year or two, or even more.

If the tooth is of comparatively little use, it is usually soon sacrificed, but if it is of recognized importance, and more, if it is one of great importance, even in the limited use of a diseased tooth, it is often endured for years.

I desire at this point to impress the fact that the foregoing remarks apply only to cases in which the pain from dental exostosis is *dentally localized.*

It is very important that this should be fully recognized, for aside from these cases the range of trouble from dental exostosis is simply immense.

Cheek-ache, jaw-ache, tic-douloureux, otalgia, cophosis, ophthalmalgia, amblyopia, amaurosis, cephalalgia, pains in distant parts of the body (vaguely termed *neuralgic*), paralysis (especially of the face, arms, or hands), and even fits (as catalepsy and epilepsy), are proven to be either entirely or partially dependent upon dental exostosis from the *relief* or *perfect cure* which results from the extraction of the exostosed teeth.

In my own private practice I have had many cases of every trouble of which I have made mention.

A recital of the cases which I have treated in connection with dental exostosis would alone form an immense volume, and would only extend, almost indefinitely, that which may be found in such works as Harris, Bond, Tomes, etc., without, as I think, being of any compensating value.

Instead of case illustrations, I shall therefore merely state in general terms that dental exostosis, when its inflictions are *not dentally localized*, has been *proven* capable of producing *almost any amount of suffering*, and the strangest and most persistent and complete interference with *either general or special functional action.*

Cases of *cheek-ache, jaw-ache, and tic-douloureux* of frightful severity are the first, and seemingly most natural, results of dental exostosis which I have mentioned; but a close study of the nerve relations which so peculiarly *unite the fifth pair with the fortunes of the whole economy* will soon show that such affections as I have mentioned above are only what might reasonably be expected.

The special senses of hearing and sight are those most usually and *most notably* interfered with. *Pain in the ear* is usually the first effect of dental exostosis in the direction of this special organ.

This is an uneasiness, an aching, a fullness which seems *something like* a gathering (and it is this "something like" which is a *distinguishing* diagnostic), a heaviness or sense of weight, together with a slight interference with hearing during the existence of the other sensations, which is relieved during their intermissions.

These may be the extent of the infliction. It is ordinarily treated by the general practitioner *in a general way*, until both patient and practitioner become convinced of the uselessness of this course.

Either a specialist of aural disease or a dentist is then consulted, when the prospect brightens by the discovery of certain teeth or roots which may be exostosed. These are carefully extracted, *one by one*, as the diagnosis is proven by examination, and the effect noted, and the result is prompt diminution of disagreeable symptoms and rapid restoration of the parts to a normal condition.

But, again, these symptoms may be gradually increased until excessive suffering results in an expression of all the varied pains, noises, and torments which can locate in the ear, and these may end in absolute deafness.

The most decided case of this kind which I have treated was that of a lady who had been completely deaf in the left ear for seven years; the sense of the other ear was so interfered with, sympathetically, that only *very loud* talking could be heard by her. After having exhausted general treatment she was sent to me, with the request that "as teeth sometimes caused such troubles" I would please *extract all her teeth.*

Upon close inquiry, finding that the disagreeable sensation commenced *in* the *left ear* (not *about* it), I concluded that if the teeth were the cause of her trouble it was probably due to *upper* teeth. I extracted the left superior wisdom-tooth, and found the root largely exostosed. I then extracted the left superior second molar, finding its *three* roots *almost as one*, from exostosis. As no other teeth gave the least indication of abnormality from either the pressure or blow test, nor from hot or cold applications, I then determined to await the result of these removals.

In two weeks (consentaneously with the comfortable healing of the jaw) improvement began, in a month she heard ordinarily loud conversation, and in ten weeks she heard a "Thanksgiving" sermon (which she said was a very appropriate discourse!) for the first time in seven years. This was fourteen years ago, and the patient eats with her own teeth to this day.

Pain in the eye is usually the first effect of dental exostosis in the direction of this special organ.

To this, which is at first but slight, *though deep-seated* (a diagnostic), is slowly added a dimness of *acute* vision, a blurring, or running together of letters, an indistinctness of general vision, most markedly during the paroxysms of suffering.

This increases until the whole eyeball aches "*like a toothache*" and it feels as though it would be a relief "*to extract it.*"

In proportion as this pain increases in frequency and severity so vision diminishes, but *absolute* (incurable) *blindness* never has presented in my experience.

If the patient be directed so as to face the bright sun of noonday, *light is discernible*, while if the face be turned from it *into the room*, it is *perfectly dark;* this is proof that while *all* functional action of the optic nerve is *practically* interfered with, it is, nevertheless, capable of possible restoration.

As the result of the extraction of exostosed teeth, I have had a patient who was thus totally blind in one eye read perfectly well with that eye in six weeks.

Pains in the *jaws* and *cheeks* are usually very promptly relieved by the removal of the cause of trouble, but pains and functional disturbances in both ears and eyes are more slowly removed, and cures should not be *expected* in less time than weeks, or perhaps months.

Cephalalgia is one of the frequent results of dental exostosis. When this is the case the pain is usually *deep-seated*, behind the ears, inside, in the back part of the head, but it is also noticeable that other complaints (gastric, hepatic, uterine, etc.) give *direction* to headaches, which the removal of exostosed roots or teeth has proven, by cure, to have been actually dependent upon them as the *prime* cause; thus, while exostosed teeth may not be irritants sufficient to excite such cephalagia as to be other than bearable, yet in cases of gastric difficulty (dyspepsia) the *additional* pressure of indigestible food in the stomach will at once induce all that intense headache which has, for concomitants, such bursting fullness of the forehead and such tenderness upon pressure on the top of the head.

In hepatic derangement, the paroxysms of headache from dental exostosis are increased by the nausea and vertigo, the dimness of vision and *brow-ache*, and the complete inability for any exertion which is the accepted type for "bilious sick headache."

In uterine complications, exostosis headaches naturally assume the periodicity of menstrual function, adding to the annoyance and pain, which are far too frequently its accompaniment, intense neuralgic cephalalgia.

It seems that with every "period" an hyperæsthetic condition is developed which renders any irritant capable of its utmost irritation, and thus it is that the peculiar headache of the right frontal and parietal portion is intensified. It is to this general systemic complication that cephalalgia, which is due *largely* to dental exostosis, is very unamenable to treatment, but it is also true that the discovery of this cause and the consequent removal of all affected teeth is productive of very gratifying amelioration of severe suffering.

Pains in distant parts of the body (vaguely termed "neuralgic") have been repeatedly found to disappear after the extraction of teeth which had at last become so much exostosed as to direct attention to a "localization" of pain in them.

These are, for the most part, instances of *unexpected* relief, but so many such have occurred that we feel it warrantable to accredit dental exostosis with a capacity for infliction which is limited only by the extent of the entire body. As a "corn" upon a toe makes an arm ache even to the very fingers' ends, so an exostosed tooth may give pain even to the end of the finger or toe,—a pain which is referable at first *only* to these distant parts, but which has been entirely relieved by the extraction of the finally painful tooth.

Paralysis, especially of the face, arms, and hands, is a lesion constantly dependent upon irritation of the dental extremities of the *fifth pair*, and to dental exostosis we have to ascribe its full share of cases.

It has sometimes seemed to me that I have had more than my share of such cases, for, as the result of treatment, by extraction of the teeth, of such troubles arising from this disease, the specimens of my own private collections are numbered by scores.

Catalepsy and epilepsy have both been notably relieved, and occasionally cured, by the extraction of exostosed teeth. I have had one case of epilepsy from which patient I took six teeth (extracting alternate teeth), and thus breaking up the arch prevented the *pressure* which he complained of in connection with his teeth. Every tooth was considerably exostosed, although he was quite young (twenty), and the result of the operation was sudden and complete cessation of the fits for fifteen months (he had had them before every few weeks), after which they gradually reappeared. The patient is now a confirmed epileptic, and as the disease was *markedly hereditary*, it was thought not advisable to deprive him of *all* his teeth.

Treatment.—It will be gathered from my frequent allusion to "extraction" that this operation is *my treatment* for this disease when fairly suspected; such is the case, for, although all kinds of treatment, from *counter-irritation* to removal of exostosed tissue and *replantation of the tooth*, have been suggested by various authors, I have never yet had any success in the range of the milder treatment, and have never yet had a case of this disease in which I felt that replantation was demanded, or, indeed, was the *prudent* proceeding.

The lesions for which a cure was attempted were in every instance so much more serious than the loss of the tooth, or teeth, that I did not deem it advisable to risk any possible preventive to the full effect of a complete removal of the *supposed cause.*

In the performance of the operation of extraction, it is one thing to attempt it, and decidedly another thing to *do it.*

The roots are sometimes far larger than the crown, and they are almost always larger than the neck of the tooth, while they are certain to be larger at the exostosed portion than they are just below it.

It is therefore no unfrequent accident to fracture the tooth in the attempt to extract; an untoward incident which seriously increases the difficulty of removing the remaining piece,—the piece which *must be removed.*

When upon the subject of "absorption of permanent roots" (January Dental Cosmos, 1877), I referred to the operation of drilling out the cellular jaw structure surrounding the alveolus containing the deeply-imbedded root by means of a "fissure drill" (No. 56, 57, or 58), and I can only now repeat that any one who tries this method of extracting exostosed roots will never again inflict the ugly, slow-healing wound which results from the usual cutting through of the alveolar walls.

(To be continued.)

THE CASE OF THE WISDOM-TOOTH IN RELATION TO THE HYPOTHESIS OF THE ULTIMATE SUPPRESSION OF THE TEETH IN MAN.

BY A. H. THOMPSON, D.D.S., TOPEKA, KANSAS.

The literature of the dental profession, and of its tributary sciences, contains little that may be considered as conducing towards the elucidation and explanation of the present degeneracy and defectiveness of the wisdom-tooth, or third molar, in man. The subject has been written and speculated upon to some extent, and investigation has been comparatively active in this direction, but, as yet, little discussion of the data obtained has been attempted.

The facts and data which we now possess are, unfortunately, very meager in comparison to the importance of the subject; but the amount will, most probably, be rapidly augmented to the extent which its importance warrants and deserves. This unmistakable importance, and the value of the lessons which our subject teaches, have been slow of recognition, but the appreciation which has been so tardy, and which is its due, will, we earnestly hope, speedily accrue to it.

But while regretting the paucity of recorded observations from which to make deductions, we seem urged to the study and elaboration of the important lessons and apparent meanings which even the limited knowledge at our command teaches us. These lessons appear to be of such importance that they are, if true, a helpful index to things that may throw light upon the developmental history of the human organism, and particularly of the anatomical region related to the wisdom-tooth, and involved in its purpose and destiny.

Preliminary to the study of the meanings conveyed by the phenomena presented by the wisdom-tooth, perhaps a recapitulation of our knowledge concerning its formation, characteristics, etc., will not be inappropriate.

PART I.—DESCRIPTIVE.

The *origin* and *formation* of the wisdom-tooth in man is thus clearly described by Prof. Carl Wedl:* "The posterior dental groove, ascending from the base of the coronoid process, and bending upwards like a bow over the tuberosity, . . . resembles the dental groove in the jaw of a three-months' fœtus. It is covered by a delicate mucous membrane. At a later period there appears in the posterior segment a small crypt, about the size of a millet-seed, which is intended for the third molar. . . . About the twelfth year the alveolus of the wisdom-tooth . . . is still situated high up in the tuberosity of the upper, and in the base

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* Path. of Teeth, p. 85.

of the ascending coronoid process of the lower jaw. As the growth of the posterior segments of the jaws is advanced considerably, which process takes place much more slowly than in earlier years, the alveoli of the wisdom-teeth begin to advance, and finally reach the level of the dental range. In the mean time the alveoli of their crowns have become deeper and wider, and the coronal cusps become perceptible in the apertures upon the alveolar process, and gradually become larger by resorption. . . . The opinion is entertained by some that the germ of the wisdom-tooth is derived from a process of that of the second molar; but the facts which have been mentioned—that, as the growth of the posterior segment of the jaw advances, the mucous membrane becomes extended over the posterior dental groove, and that the development of the wisdom-tooth occurs within the latter—are much more in favor of the view that the germ of this tooth, like those of the other teeth, is the product of the formation of a sac and papillæ directly from the epithelium and corium of the mucous membrane. I have been unable to obtain histological evidence in proof of the latter theory, yet I consider it, nevertheless, as probable. According to Kollman, the enamel germs of the second and third molars are not developed directly from the epithelium of the oral cavity, but from the enamel germ of the first molar." Prof. John Tomes* says at the twelfth or thirteenth year of age "the crypts for the third molars hold the positions which those for the second molars held when the first molars emerged from their bony cells and occupied the terminal portion of the alveolar tract," thus exhibiting a similar relationship. Mr. Chas. S. Tomes says,† "The second permanent molar originates from the neck of the enamel organ of the first molar. . . . The enamel germ of the wisdom-tooth is similarly derived from the neck of that of the second permanent molar."

These extracts may be accepted as a fair statement of our present knowledge upon the subject of the origin of this tooth, but upon which much yet remains to be observed.

The next step is the *eruption*, and upon this part of our subject recorded observation is much more complete, and our knowledge more full of the process of the appearance of this erratic member of the dental group, with all its irregularities and lamentable eccentricities.

The wisdom-tooth erupts, in most of the cases in which it appears at all, between the years of sixteen and twenty-one and a half.‡ Wedl puts it§ as occurring, "as is well known, a few years before or after the twentieth year of life." But, as Mr. Felix Weiss remarks,‖ "that which more than anything else distinguishes these strangely variable teeth is the irregular periods at which they are erupted." This tooth is, in fact, notorious for its disregard of the text-book period of eruption, and has an extensive range of flexibility in this respect, having, indeed, appeared as early as the twelfth and as late as the eightieth year of age. Of the extreme minimum age of eruption, cases are on record of the appearance of these teeth at the age of thirteen,* of all four in position at sixteen,† and others; or they frequently delay appearance until the thirtieth or fortieth year,‡ occasionally till fifty or sixty,§ rarely till seventy-five,|| and even later, the maximum recorded age being eighty-five.¶ Mr. Felix Weiss has made some most praiseworthy observations and statistics** in regard to the eruption of the wisdom-teeth, which give us a very fair estimate of their variability. He found that "of three hundred and twelve persons over twenty-six years of age, fifty-two had deficiencies of wisdom-teeth; twenty-nine had none at all; forty-four had deficiencies in upper and lower; seventy-six had deficiencies in upper only; thirty-two had deficiencies in lower only; twenty-one with deficiencies were over fifty years of age. In three hundred and twelve persons three hundred and four wisdom-teeth were absent;" a little over twenty-five per cent., which may, probably, be considered a very fair estimate of the average. He continues: "That the wisdom-teeth are erupted late in life we have plenty of evidence to prove, but that they are sometimes absent altogether I am fully persuaded, and that they take the first place as absentees my late examinations seem to indicate. I have seen several mouths in which the wisdom-tooth was cut after the age of seventy, and in one at eighty-four."

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* Dental Surgery, p. 129.

† Dental Anatomy, p. 128.

‡ J. Tomes's Dental Surgery, p. 129.

§ Op. cit., p. 86.

‖ Proc. Odon. Soc. G. B., in Brit. Jour. Den. Sci., vol. xix. p. 256.

The excessive variability as to the age of eruption, and the absence of anything approaching to constancy in the eruption of a definite *number* of these teeth, to say nothing of chronic abnormality of form and departure from physiological and anatomical perfection of every kind, is probably without parallel in any other region or part of the economy. Irregularity in number is a rather constant condition (as the previous cited observations of Mr. Felix Weiss prove), as partial or complete absence takes place in about twenty-five per cent. of the number of persons of civilized nations, in whom the teeth are either not formed, fail of development, or do not erupt into view. All of these causes contribute to their suppression in individual cases where the wisdom-teeth fail to appear. Many writers, especially those of the older school, are of the opinion that they merely fail to come into

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* DENTAL COSMOS, vol. xviii. p. 56.

† Ibid., vol. xvii. p. 614.

‡ Dr. C. A. Harris, Dental Surgery, p. 133.

§ Mr. Thos Bell, On the Teeth, p. 25.

|| Brit. Jour. Den. Sci., vol. xviii.

¶ Mr. Felix Weiss, op. cit.

** Ibid.

view from retarded eruption or misdirection. Mr. Bell* says, "Mr. Hunter speaks of considerable variation of the number of teeth arising from the occasional absence of the last grinder in one or both jaws. There is, however, every reason to believe that this tooth is as constantly formed in the jaw as the others, and still more than some. These teeth are formed in the jaw, and often erupt late in life." Prof. Wedl† says the "wisdom-teeth, especially those of the under jaw, are most frequently subject to retention. The space necessary for their eruption in the maxillary arches, which so frequently do not grow to a sufficient length, is preoccupied by the teeth which have made their appearance, and therefore there is no room left for the wisdom-teeth. Sometimes the upper second molar is crowded so far backwards towards the tuberosity that the further descent of the third molar becomes impossible. In the same way the space in the lower jaw becomes diminished when the second molar is crowded close up to the ascending ramus. In addition to the disproportion between the lengths of the maxillary and dental arches, special causes, which are not readily distinguishable, also occasion the retention of the wisdom-teeth. Sometimes, during the process of cicatrization which ensues after the detachment of the first molar, the second molar acquires a forward inclination which prevents the emergence of the wisdom-tooth, since the posterior external root of the former impinges upon and opposes the advance of the crown of the latter. Sometimes a union of the roots of the second molar with those of the wisdom-tooth also prevents the descent of the latter. In such cases the wisdom-teeth are found in a normal position," but are situated high up in the bone, or, as Prof. J. Tomes says,‡ "there may not be sufficient space between the second molar and the ramus for the wisdom-tooth to protrude itself; it then either becomes developed below the alveolar margin, or it comes up partly within the base of the ramus. . . . In the upper maxilla it may be situated in the posterior portion of the tuberosity, above the level of the alveoli, and in the lower jaw, within the ramus . . . (Case in which the lower wisdom-teeth on either side had grown nearly up to the level of the sigmoid notch within the ramus.)" Farther on he remarks upon the significant fact that mal-position has been assumed (in some cases) "at a comparatively early period of development, irrespective of resistance at the time of eruption." While retention may thus play an important part in the suppression and absence of the wisdom-tooth, many of the absentees have really never been developed, and many have not been originated on account of the contraction of the jaw and compression of the germ, and this has operated through the law of inheritance in transmitting the deficiency with continuous tendency towards the abolition of the tooth. Mr. Felix Weiss* strikes the most probable theory when he says, "That the wisdom-teeth are erupted late, etc. . . . we have plenty of evidence to prove, but that they are sometimes absent altogether I am fully persuaded. . . . May not the original tooth germ be sometimes absorbed, leaving no vestige of its existence? In one lower jaw . . . the fourteen teeth were all perfectly formed, but there was no indication of a wisdom-tooth ever having been developed. In another the fourteen upper teeth were all erupted, but no third molar could be discovered," or, as Mr. C. S. Tomes says,† "The upper wisdom-tooth is especially apt to be cramped" in development. Mr. Weiss also dwells upon the fact that "when any of the permanent teeth are absent the wisdom-teeth are generally found to be missing," and exhibited cases illustrating it. "The next teeth rating in the order of frequency of absence are the upper lateral incisors."

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* Op. cit., p. 25.

† Op. cit., p. 128. Dr. Jas. Truman (DENTAL COSMOS, vol. xvi. p. 406) insists that they are always merely retained when absent.

‡ Op. cit., pp. 231, 232–34.

Irregularity in the number of these teeth sometimes varies in the direction of its augmentation and increase. This occurs by the addition of a fourth molar, the duplication of the wisdom-tooth, or the eruption of a supernumerary tooth in a neighboring position. As Wedl says,‡ "Wisdom-teeth are sometimes duplicated, one standing within and the other without the dental range. The latter is always the supernumerary tooth, and occurs upon the outer side of the one in the range, and generally has a much smaller crown, and a stunted, roundish root. Supernumerary molars are extremely rare, and still more rare is their arrangement in the normal dental row." He then cites a case in which a fourth molar occurs in each side of each jaw. Fourth molars must be distinguished as those which are developed in the normal dental row. Of these quite a number of cases are on record, in addition to that of Wedl.§ A number of cases of duplicated wisdom-teeth—*i.e.*, those which are of good size, and are either external or internal to the normal third molar in position—are also on record,|| but these partake more of the nature of monstrosities. In the writer's practice recently a case (young man, æt. about thirty) presented in which the third left superior molar had been extracted about five years since, and about one year after that time *two* wisdom-

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* Op. cit. † Op. cit., p. 382. ‡ Op. cit., p. 101.

§ DENTAL COSMOS, vol. x. p. 245; Mo. Den. Jour., vol. v. p. 196; Brit. Jour. Den. Sci., vol. xix. p. 255–60; DENTAL COSMOS, vol. xvi. p. 619, etc.

|| Brit. Jour. Den. Sci., vol. xix. p. 255; J. Tomes, op. cit., p. 254, etc.

teeth appeared in the rear of the second molar, forming with it a symmetrical triangle in arrangement. Supernumerary teeth occur bearing the relationship, as they doubtless usually do, of duplicate wisdom-teeth. Wedl says of these two classes,* "When the upper wisdom-teeth are duplicated, the normal, well-developed tooth is located in the dental range, while the supernumerary one is located . . . on the buccal side, and scarcely attains two thirds the size of the other." Several cases of supernumeraries are on record.† A case in the writer's practice presented with a dwarfed, conical tooth growing close between the right superior second and third molars, on the buccal side. The peculiarity is sometimes presented of twin formations, or symmetrical fusion of the third molar with a fourth molar or supernumerary.‡

Irregularity of *direction* of eruption is quite a common occurrence in the present stage of chronic imperfection of the wisdom-teeth, and is, probably, due solely to insufficient space for proper arrangement in the dental arch. As Wedl describes it,§ "The wisdom-teeth are most frequently the subjects of total displacement. The reason for this is quite obvious, from the fact that they are the last to take their places in the dental series, and therefore have reserved for them that space only which remains vacant at the posterior extremity of the jaw. In the upper jaw an axial displacement, by which the masticating surface becomes directed posteriorly, is the most frequent. . . . The crown of the wisdom-tooth may also be inclined externally or internally, and the roots be placed across the jaw in a more or less horizontal position. The rotation sometimes continues . . . till the masticating surface is directed upwards, and the roots downwards. In the lower jaw an inclination of the crowns of these teeth from behind forwards is most common, in which cases the growth of the roots takes place in the ascending ramus. . . . Cases in which the lower wisdom-tooth assumed a nearly horizontal position, the roots being inclined obliquely downwards and backwards, and the crown forwards. . . . Sometimes it becomes buried in the ramus, and reaches nearly to the sigmoid notch, . . . or it is inclined forward and impacted against the second molar. . . . Sometimes it presents longitudinally, and rarely facially. . . . The upper may face longitudinally." Prof. J. Tomes says,|| "The inferior third molar may be mal-placed in five different directions: first, obliquely forward, with the masti-

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* Op. cit., p. 140.

† Mo. Den. Jour., vol. v. p. 196; Dr. S. C. Harbert, Den. Surg., p. 34, etc.

‡ Dental Cosmos, vol. x. p. 245; Wedl, op. cit., p. 171; J. Tomes, op. cit., p. 275.

§ Op. cit., p. 126.

|| Amer. Jour. Den. Sci., vol. viii. p. 127.

cating surface against the posterior surface of the second molar; second, outwards, towards the cheek, and become imbedded in the latter; third, inwards, towards the tongue; fourth, upwards, into the coronoid process, either partially or completely within the bone; fifth, natural position in the jaw, but held down by indurated gum. . . . Immediately after the formation of the sac of the tooth it ascends into the coronoid process, the ramus . . . increases in length, and when sufficient space is formed the sac descends and forms a line with the more anterior teeth; but if from any cause the jaw ceases to elongate while the sac occupies the coronoid process, the tooth will be developed in that situation. . . . If the maxillary growth stops when the sac has descended to the angle only, the tooth will be directed forwards. If growth should cease when it has descended and fallen into line, but before sufficient space has been formed for its evolution in the vertical direction, it will be directed outwards or inwards, taking the direction of least resistance. . . . When in the alveolar line, indurated gum sometimes prevents eruption.* . . . In the upper jaw the wisdom-tooth develops within the tuberosity, above the level of the alveolus, . . . and erupts, when abnormal in direction, either forwards, outwards, inwards, or backwards, . . . but in the upper the oblique direction is less frequently assumed than in the lower. The outward direction is more frequent (case of piercing the cheek completely). The oblique inward direction is very unusual." Unusual manifestations of mal-position sometimes occur, as in the case of a wisdom-tooth erupting in place of an upper lateral which had been extracted.

The *pathological lesions* consequent upon the various irritations due to mal-position have been a fruitful source of suffering to many, if not most, individuals of the race; but, as has been said, "Difficult eruptions, due to insufficient space in the jaws, produce marked phenomena, which, as Hunter observed, are more localized, while in first dentition they are more general." Prof. J. Tomes says of this subject,† "No doubt these teeth are seldom cut without greater inconvenience to the patient than the anterior molars. . . . They are, from the obstacles opposed to their eruption, a frequent cause of suffering, more especially in the lower jaw. . . . It would appear to be the exception, rather than the rule, for these teeth to take their place among the organs of mastication without producing some amount of suffering at the time of their eruption, and the degree of inconvenience is often sufficiently great to need professional assistance. . . . When the inferior wisdom-tooth erupts partially under the coronoid process, or close to it, leaving no room for the gum, the latter is forced upwards, and lies more or less over the masticating surface of the tooth, and is consequently subject to be bruised by the upper teeth. . . . The diseased condition usually extends to the adjoining parts, invading the soft tissues about the ascending ramus, and extending from thence to the fauces; deglutition becomes painful, and also the motion of the jaw.* . . . The wisdom-teeth of the upper jaw, when taking a false direction, give rise to great inconvenience, but the more distressing symptoms are generally connected with the lower. . . . It is obvious that the evils produced by the development of irregularly placed wisdom-teeth arise wholly from pressure produced by the gradual growth of the dental pulp preparatory to its calcification, by which the superimposed tooth is forced against the tissues by which it is covered. In the natural course of things these tissues are absorbed, and make way for the rising tooth. But if they are not absorbed, and therefore resist the advance of the tooth, the pressure reacts through the tooth upon the developing pulp." A numerous array of diseases and local lesions arise from the various sources of irritation produced by the mal-position of the wisdom-tooth,—impaction, retention, insufficient space, etc. In the following list the number of recorded cases of some diseases is quite surprising. This includes fusion with the second molar,† trismus,‡ paralysis,§ fixation of the jaw,|| neuralgia,¶ ulcerated neck,** tumor,†† local inflammation and suppuration (quite common), exostosis,‡‡ ulcerated tongue,§§ fungous flesh, tonsillitis,||||

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* Den. Surg., pp. 232, 233, 236.

† Ibid., pp. 228, 230.

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* Amer. Jour. Den. Sci., op. cit., and pp. 132, 133.

† Wedl, p. 126 (who says of this disease, "If the coronoid portion is bent from its usual position so as to describe an arc of 90°, the growth of the roots takes place from behind forwards in a more or less horizontal direction, and the latter come in contact with those of the second molar, and sometimes even blend with them, so that the second and third molars, by the coalescence of their roots, form an inseparable whole"). Also (cases), Wedl, p. 149; Mo. Den. Jour., vol. viii. p. 145; vol. v. p. 236; DENTAL COSMOS, vol. xvii. p. 260; vol. xv. pp. 279, 665; vol. x. p. 245; Amer. Jour. Den. Sci., vol. v. p. 225; vol. i. p. 177; Harris, op. cit., p. 173; John Tomes's Den. Surg., p. 285, etc.

‡ DENTAL COSMOS, vol. x. p. 558; Wedl, op. cit., p. 158, etc.

§ DENTAL COSMOS, vol. x. pp. 558, 559; Amer. Jour. Den. Sci., vol. viii. p. 366.

|| Brit. Jour. Den. Sci., vol. xix. pp. 384, 411, etc.

¶ DENTAL COSMOS, vol. x. pp. 588–89; vol. xvi. pp. 407–10–12–14; Amer. Jour. Den. Sci., vol. viii. p. 365; Wedl, p. 441, etc.

** DENTAL COSMOS, vol. x. p. 560; vol. xvi. p. 414; Amer. Jour. Den. Sci., vol. viii. p. 130.

†† Wedl, p. 159; Garretson's Surg. of Mouth, p. 151, etc.

‡‡ Amer. Jour. Den. Sci., vol. vii. p. 111; J. Tomes's Den. Surg., p. 660; Brit. Jour. Den. Sci., vol. xix. p. 404, etc.

§§ J. Tomes's Den. Surg., etc.

|||| DENTAL COSMOS, vol. xvi. p. 414, etc.

mental derangement,[*] erysipelas, necrosis of bone,[†] odontoid growths,[‡] dentigerous cyst[§] (in a table of the comparative frequency of this disease it was found that lower third molars are the teeth usually encysted; in fact, 7 out of a total of 28 occurred), sinus and abscess,[||] amaurosis,[¶] loss of hearing,[¶] suppuration and death,[**] lockjaw and death,[**] and other diseases of more or less systemic complication are of occasional occurrence, exhibiting how powerfully a perhaps small, erratic movement may affect for evil and disaster. Mr. Felix Weiss[††] thus sums up the lesions which may be occasioned, and their causes and effects: "But the eruption of this third molar is not generally unattended with pain. We have frequently a series of disturbances, the least of which is a certain amount of suffering to the patient. . . . Upon examining more minutely the results, we perceive that the second molar standing in front, and the termination of the alveolus behind, the wisdom-tooth, not having a predecessor, and its development being carried on beneath the base of the coronoid process, when the time arrives for its eruption it has no space reserved for it, and in the generality of cases it cannot take its place without suffering, particularly in the lower jaw. Nor is this limited only to the part affected; it extends to the surrounding structures, causing the neighboring muscles to become more or less rigid, and setting up inflammation, attended sometimes by suppuration, the pus not unfrequently burrowing around the periosteum, . . . and occasionally leading to necrosis of the jaw. . . . The tooth may also become impacted against the second molar."

Irregularity of *form* and *structure* are also conspicuous characteristics of the wisdom-tooth; in fact, deviation from normality towards incompleteness of form and imperfection of organization and structure seems to be its most frequent condition in man. Harris describes it[‡‡] as being "both shorter and smaller than the other molars, . . . and that the roots of the upper are occasionally united, while the lower usually has but one root." Wedl says,[§§] "The crowns of the wisdom-teeth, especially the upper ones, are most frequently stunted in their growth. . . . Dwarfish growth affects these teeth most frequently, and occurs by itself, often unaccompanied by any other deformity." Prof. John Tomes[||||] says, "First molars will be found to be the most constant, and the third molars least constant, in the number, shape, and positions of their roots. . . . In first molars departures from normality are very uncommon, in second molars less rare, and in the wisdom-tooth the typical form is very seldom produced. No rule can be laid down for the form and number of the roots of the wisdom-tooth, so varied and inconstant are the forms assumed. In one case the tooth is terminated by a single conical root; in another, the one is replaced by five or six small roots." Or again, he says,* "The third molar of the upper jaw generally resembles the other molars, but is more irregular in form, and less in size. The fangs are frequently compressed into a conical mass, sometimes turning in one direction, sometimes in another. . . . The crown is commonly larger from side to side than from before backwards. . . . The inferior wisdom-tooth is larger than its fellow above. The crown usually bears four cusps, and resembles the adjoining molars, except that it has a more rounded appearance. The two roots are generally directed backwards, and are commonly connate, with grooves indicating a tendency to the formation of four fangs corresponding with the four cusps." Mr. Felix Weiss† also observes, "This particular tooth varies not only in shape but also in size. On the right we may have a perfectly developed molar, on the left a cubic-crowned tooth resembling a lower bicuspid." Mr. Charles Tomes says,‡ "Amongst civilized races it is almost exceptional for the upper wisdom-teeth to be regular in form or position, so that extreme variability prevails among these teeth. The two inner tubercles are blended together, and the fangs are very commonly confluent, forming an abruptly tapering cone, . . . so that but little vestige of the three fangs can be traced, the pulp-cavity even being quite single. The under one is seldom as small as the upper, and its crown is often large, even when its roots are very stunted. . . . As a rule the wisdom-tooth is much smaller than the other molars, does not bear the characteristic pattern of cusps and grooves, has its roots connate, and is not infrequently a mere rudimentary peg."

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[*] DENTAL COSMOS, vol. xvi. p. 412, etc.

[†] Amer. Jour. Den. Sci., vol. vi. p. 326, etc.

[‡] Mo. Den. Jour., vol. vii. p. 201, etc.

[§] Ibid., vol. iii. p. 453, etc.

[||] Brit. Jour. Den. Sci., vol. xviii. pp. 451, 611; vol. xix. pp. 258–59, etc.

[¶] DENTAL COSMOS, vol. xvi. p. 408; Wedl, p. 438, etc.

[**] Dental Anomalies (DENTAL COSMOS, vol. xvi. p. 412).

[††] Op. cit.

[‡‡] Op. cit., p. 61.

[§§] Op. cit., p. 157.

[||||] Den. Surg., pp. 278–79.

The *structural integrity* of this tooth is, as a rule, compromised in the direction of imperfection and softness. The enamel and dentine both present features of defectiveness that indicate its lack of organic and inorganic perfection of structure only too plainly. It is, indeed, scarcely necessary to call the regular practitioner's attention to the facts that the wisdom-tooth is, above all the other teeth, as a rule, much more amenable to the attacks of caries upon all of its surfaces; that its grinding face is especially susceptible on account of deficient protection from the enamel, which, even if this were good, is imperfect in the mechanical juxtaposition of its folds, to say nothing of lack of fusion; that caries progresses with a directly increased ratio of rapidity in the substance of this tooth, when inaugurated; and that this tooth in a given case becomes disintegrated much more rapidly than the other teeth in the same denture when attacked by caries. These propositions, we think, are warranted by common observation and experience in practice; so much so, indeed, as to make it a serious question as to the practicability of attempting the conservation of the third molar in the majority of persons, unless of special value to the individual on account of the loss of other molars. And yet there are not wanting writers who uphold the theory of the complete and parallel perfection of the wisdom-tooth, and advise its preservation in all cases. Garretson* says that the impression that they decay early is erroneous, and that "four-fifths of these teeth which decay are destroyed by the operculum of gum which overlays them,"—in some cases. Several other writers are also of the opinion, and have placed themselves upon record, as upholding this theory of the wisdom-teeth, in opposition, it really seems, to evidence, and who, we cannot think, have made sufficient comparison of observations.

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* Amer. Jour. Den. Sci., vol. vii. p. 14.

† Op. cit.

‡ Op. cit., pp. 19, 382.

The *attachment* of the wisdom-tooth is usually comparatively slight, having a light alveolus and a rather shallow implantation, in many, if not most cases; it is thus "readily detached,† except when the roots are crooked."‡ The process is rather soft and spongy, and does not support the tooth as the alveolus of the other teeth upholds them in mastication.

(To be continued.)

REGULATION OF TEETH MADE EASY BY THE POSITIVE SYSTEM.

BY J. N. FARRAR, M.D., BROOKLYN, N. Y.

THREE ESTHETIC LINES OF ARCH, MIXED CLASS OF IRREGULARITY.

V.

IN the regulation of the teeth, it is not only desirable to move them in a proper and scientific manner, but it is important to understand what constitutes the proper esthetic line of beauty in the arch, in order that the greatest degree of harmony may be attained between the teeth and the various features of the face. So far as the arrangement is concerned, this artistic judgment is as important in regulating teeth as in the making of artificial ones; for in the proper balancing of parts lies the secret of harmony and beauty.

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* Op. cit., p. 153.

† Snell, op. cit., p. 84.

‡ Bell, op. cit.

There appear to be two, if not three, principal esthetic lines of beauty in the human dental arch, each being in harmony with certain types of features and faces, and we may almost say peculiar to certain races. But as in all races more or less of all these types of faces are to be found, it may be better not to make national classifications, except, perhaps, so far as to partially illustrate and stamp upon the memory the different lines of the other features.

There being different types of equal degrees of beauty in the human face, it will be plainly seen that what constitutes perfection in the dental arch of one person may not in that of another. Although the term perfect arch, in its highest sense, signifies perfection in everything pertaining to the teeth and their relations with every part of the mouth and face, yet, in its common acceptation, it may have two meanings:

1st. The continuity of all the parts, with no member (tooth) missing, which does not necessarily include perfection of beauty in relation to the features.

2d. The artistic or esthetic aspect, or that line of beauty which best harmonizes with the features, and which does not necessarily require the presence of the full and normal number of teeth. It may imply a deviation from the normal complement,—a condition that it is sometimes not only necessary to make artificially (by extraction), in order to produce the greatest degree of harmony, and, consequently, beauty, of the face, but one which is sometimes occasioned by some natural cause interfering with the law of development, which more or less arrests the development of the full number, and which may or may not be harmonious with the other features.

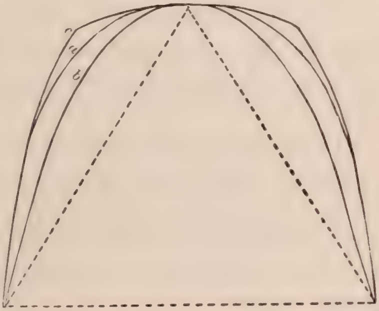
The esthetic lines in the dental arch differ mainly in the size and degree of the curve in front. Thus we have the larger or Gallic arch (omnivorous type), like that often seen in the broad-shouldered, squarely-built, round-headed Englishman, and the smaller (carnivorous type) or Latin arch, like that oftenest seen in ladies of medium height who are narrow across the shoulders, with small bones, and of rather light build, and who are generally fair and "plump," and who in early and middle adult life may be, on the whole, called "good-looking," or "rather beautiful."

The third is an arch peculiar to that seen in herbivorous animals (horse for instance), or that line which resembles the so-called "arches" in the old Central American or Aztec architecture, which consisted of two upright walls leaning somewhat towards each other, and connected at the top by a straight cap or span,—an arrangement of the teeth in which the cuspids stand out so prominently that the arch may be said to have three sides; the front six teeth being in nearly a straight line, and the bicuspids and molar teeth arranged in almost straight lines from the cuspids, thus producing a line somewhat like that bounding three sides of a square, the distance of which is greater between the extremities than between the cuspid teeth.

This arrangement of the teeth, which is oftenest seen in the Celtic (Irish) race, I am inclined to class as one of the esthetic lines of the dental arch; not that the other lines would not often appear well where this is found, but that there are faces with strong, prominent, angular features, like those so commonly met with in the Irish and Scotch races, where the angular arch may be said to be more in harmony than the regular curve. Still, great judgment should be exercised before this order be adopted in regulating teeth.

It will be seen that if this classification of the lines of beauty be correct, it is necessary to know where they belong; for a line that is proper for one face may not be so for another.

FIG. 9.



THE THREE TYPICAL ESTHETIC LINES OF THE DENTAL ARCH.

a Represents the Gallic arch.
b " " Latin "
c " " Celtic "

The broad or Gallic curve in a narrow face will give the appearance of "muchness" of teeth, while the narrow in the broad, round face would cause a deformity about the cheeks, and corners of the mouth, and also of the nose,—a "pinched" appearance which would be out of harmony with the rest of the face.

The angular or Celtic arch, though it would *sometimes* appear well in an angular face with "high cheek-bones," large mouth, eyes, nose, and chin, would be an absolute deformity if associated with round features.

With these points in view, and the esthetic lines proper to the individual being determined, after a proper consideration of the antagonism of the jaws (*an important point*), with a view to prospective harmony in the contour of the lips and their surroundings, settle in the mind the changes desirable and the direction and extent necessary for the movement of the teeth to attain them.

Having in the last paper dwelt upon the question of the correction of that class of irregularities where the teeth are entirely outside of the esthetic line, as seen in the so-called "thumb-sucking" variety, we will necessarily be obliged to continue to touch upon the subject of "drawing in," and even rotation of teeth, while at the same time treating upon other movements belonging to the next or mixed class of irregularities.

The division under consideration is, of necessity, an arbitrary one, since it includes all sorts of irregularities of *erupted* teeth on both sides of, as well as on the line, but leaning; but, for convenience of illustration, it may be well to discuss it now, leaving the other division to be treated typically, under the head of spreading of the arch.

As this mixed class is so variable in its degree and order of irregularities, it calls, of course, for a greater variety of modifications of mechanical appliances in order to overcome the deformities. It does not follow, however, as a rule, that *more* machines are necessary to attain success in any one given case, nor does it appear to be necessary to make more than simple modifications of a few principal forms of apparatus in order to suit any case.

This class generally implies a jumbled condition of the teeth, more or less overlapping each other. Therefore such cases, especially in the upper jaw, should be managed with a view to having the central incisors finally located evenly on each side of the median line.

In order to accomplish this, the operation, which would otherwise be simple, is sometimes very complicated, for it may be necessary to move several teeth to secure this point only. But as this will naturally come under the discussion on "spreading of the arch," it will not be considered here, except upon general principles.

All apparatus for moving teeth are constructed upon a plan calculated to draw upon or push the teeth, and, as it is a mixed class of irregularities now under consideration, it will be seen that it may legitimately call into requisition both kinds of appliances.

While the drawing machines are used on both sides of the arch, the pushing machines are *generally* only useful on the inside. As we now have a jumbled condition or order of the teeth, apparently due to lack of alveolar territory, our first effort should be to gain space for their accommodation, to make it possible to evolve order out of confusion.

This may be accomplished by extracting or by moving one or more of the teeth. The circumstances of the patient must oftentimes determine the course to pursue. What may be best for the general welfare of one patient may not be advisable for another. Age, health, habits, temperament, and financial, social, and business circumstances, will necessarily be important factors in indicating the extent and method of the operation. One patient may be quite able and willing to pay five hundred dollars, while another (for instance, a poor servant-girl) may not be able to pay ten.

Sometimes there are cases in which the extraction of one or more teeth will simplify and facilitate the operation, and will, all things considered, be best. In other cases this course would be highly improper.

Which teeth may be extracted is an important question. In regard to front teeth, I will say that while the extraction of one of the lower incisor teeth may be allowable, even advisable (because of nearly the same shape and size), there is seldom any excuse or reason for extracting an upper incisor tooth. In truth, the six upper front teeth are all prominent *feature teeth*, the loss of any one of which (unless substituted by others like them) will cause deformity.

Sometimes, however, when a bicuspid can be so shaped and placed so as to resemble a cuspid, such teeth may be extracted without much injury to the expression of the mouth, but to extract a lateral incisor in order to make room for a cuspid is very wrong. The four upper incisors should be retained, if possible, if the roots and their sockets be healthy, even though considerably diseased in the crown.

The extraction of a bicuspid on one or both sides of the jaw, especially if the arch be considerably larger than that of the opposite jaw, is frequently resorted to in order to gain room for other teeth, but unless the circumstances render it unnecessary to widen the arch, or spread apart the teeth for the purpose suggested, extraction of teeth is not generally thought to be advisable. However, as this is a question that a whole chapter might be written upon without exhausting it, only a few hints can be given in a paper like this. Judgment must supply the rest.

Having determined in what manner to gain sufficient space,—a question sometimes not easily settled,—the next thing is to devise apparatus to execute the operation.

I will only briefly call attention to a few of the simplest pieces of mechanism, but which, however, are sufficient for most cases, enough to suggest almost any others that may be necessary, by simple modifications.

Confining myself entirely to the positive system of mechanism, we will first take a case (Fig. 10), now being operated upon, where the bicuspid on the right side has been partially forced out of place, and within the *line*, and the cuspid and lateral incisor on the same side forced unduly forward, so that the lateral partially overlaps the central incisor tooth, and on the left side of the jaw the cuspid has been entirely forced without the line, so that, if extracted, only a space of one-eighth of an inch would be left between the first bicuspid and lateral incisor.

All things considered, and the upper arch being sufficiently large to project over the lower in front, it was thought advisable to extract the above-mentioned right first bicuspid and left cuspid teeth, which was done, and the following illustrated apparatus applied, and both moved in the direction indicated by arrows: *a*, represents a very thin gold strap-band, constructed as shown, which was applied around the posterior of the first molar tooth, and, extending around the cuspid, was, by means of a bolt (*a*′), united, and which, by means of a key, was made to tighten upon and drag the cuspid tooth back, as shown by the dotted line and arrow, leaving thereby sufficient space for the overlapping lateral incisor (*b*), to be subsequently drawn back also by an additional apparatus (*c*), made up of parts (*e*, *b*′, *x*), one end of which is caught over the pin (J) soldered to the band (*a*), the other end being screwed into the nut (*c*″), all of which is made to draw upon the lateral by tightening either of the bolts (*c*, *a*′).

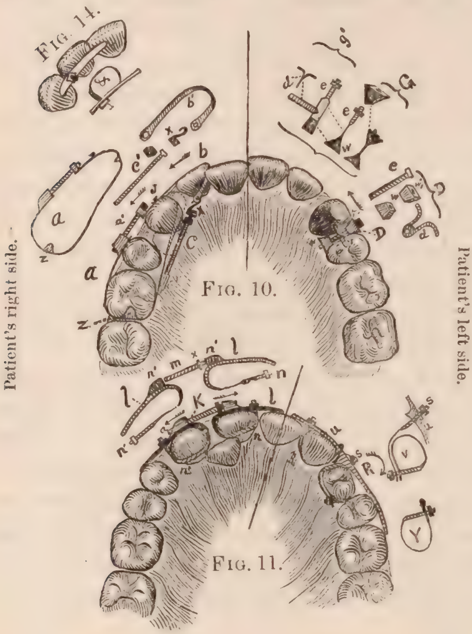


FIG. 14.
FIG. 10.
FIG. 11.

Instead of the apparatus *c*, the lateral may be moved by a small band, resembling apparatus *a*, fitted around the lateral and cuspid teeth, and operated the same way. As a rule, it is better to first move a tooth, situated, like this cuspid, sufficiently far away from its follower (lateral incisor) to accommodate it, as then the former can be held in one position, as a stationary anchor for the apparatus to be attached to, and which can be operated without complicating the forces.

To prevent these strap-bands, or binders, from impinging upon the gums by working down the tapering crown, they must always be provided with ears soldered upon the bands (or cut with the plate when made), which may be bent over the grinding surface of the tooth, and rest in the sulcus. To make the bands bind on their surfaces nearest the gum, the opposite margins should be hammered so as to elongate the opposite margin.

After the teeth are in proper position they are easily retained by a simple *little* band (Fig. 14) secured about the lateral incisor, and fastened to a bar fitted to the lingual surface of the cuspid and central incisor, as shown in the cut. By some such little unique device (&) nearly all regulated teeth may be retained for one or two years without (a "roof plate" or) inconvenience to the patient. For holding rotated teeth in position there is nothing equal to the little band with one or two arms (see also Y, Fig. 11). All these mechanisms are operated by the aid of keys or wrenches, and can be managed by the patient as well as the dentist, and should be tightened every night and morning.

On the opposite side of the jaw, the first bicuspid is being forced forward to fill the space left by the extracted tooth by means of a little separator (*D*),—an instrument sometimes useful for separating teeth for the purpose of gaining room to fill approximal cavities. This little apparatus is made in different sizes, suited to different spaces, and is composed of parts, as illustrated by *e*, *w*, *d*, in group *D*, suitable for wide spaces, and another, shown by *e*, *d*, *w*, in group *G*, *g''*, which is more useful where teeth are in close contact.

To tighten the instrument *D* for wide spaces, the key is applied to the head of the bolt (*e*), which passes through a smooth, wedge-shaped nut (*W'*) into another screw-*cut* nut (*W*). But for narrow spaces the instrument should be made up of parts, as shown in group *G*. The lingual wedge is soldered to one end of a very thin gold plate, which has a screw soldered to the other end, over which is passed loosely a smooth-bored, wedge-shaped nut, which is forced between the teeth by means of a threaded nut, as shown. To prevent these machines from impinging upon the gum by slipping down the crowns of the teeth, a piece of bent wire (*d*) may be used, passed below the bolt (*e*) and lodged in the sulci of the adjacent teeth, as shown in *D*; or, in case of the group *G*, solder on to the thin body (*e*) a V-shaped piece of plate (*d*), which, when bent over the grinding surface of the teeth, answers the same purpose.

Fig. 11 (an ideal case) represents two devices which I find very useful. *R*, on the patient's left, represents a rotating instrument in position to rotate the first bicuspid tooth. The parts, as may be seen separate (*v*, *u*, *s*), show how it must act if the nut (*S*) be tightened against the bar (*u*), with an inclined plane soldered to it (which is simply a three-cornered piece of plate, or a margin of the band bent like a dog's ear), for the tooth to slide upon.

In the cut the bar is represented as extending over several teeth, in order to gain firmer anchorage, and not cause the adjacent teeth to be moved; but, as a rule, this need not be so, as the firmness of the immediate adjoining teeth is generally sufficient. If the bar (*u*) be long, it sometimes requires to be secured to the distant tooth by means of a thin clamp-band (*v*), in order to hold the apparatus steady.

On the opposite side of the jaw is illustrated a separating apparatus (*K*), sometimes useful to gain space for outstanding teeth. This is shown in detail. The bolt (*m*) having a square nut (*X*) soldered tightly to it (to which is applied the wrench), which, with one end inserted into a smooth nut (r'), is secured into the threaded nut (a), both of which are soldered to hooks (l, l) made of stiff gold plate, about one-eighth of an inch (or less) wide, and which, if necessary, are bound to the teeth by means of metallic clamp-bands (n, n).

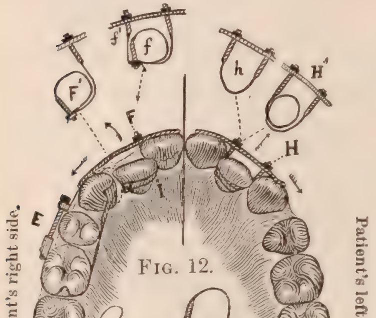


FIG. 12.

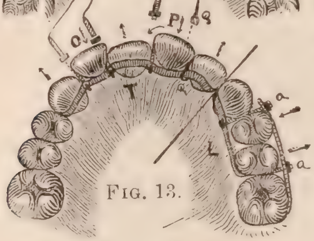


FIG. 13.

This is a very powerful spreader, and will make room even in an arch where there is apparently no chance for it.

Fig. 12 (another ideal case) shows not only how room may be gained by the contracting band (E), similarly as shown in Fig. 10, but illustrates how teeth forced out of position within the line may be drawn into place. On the patient's right may be seen a drag and rotator (F'') combined, as applied to draw into line a lateral incisor, which is not only out of line, but has rotated somewhat out of its proper position.

Experience shows that by the tightening of the nut at the joint F the tooth will not only rotate, but advance outwardly also; but should the tooth be sufficiently rotated before it is in line, by an additional screw and ribbon (f') fastened to the rotator, as shown, or by exchanging the rotator F' for another apparatus (drag-band h or H'), attached as shown in H, the tooth is easily marched out and into line.

Fig. 13 (ideal case) illustrates how teeth outside of, as well as inside of, the proper line may be made to fall into it by the same apparatus.

T represents a stiff gold bar of plate somewhere between one-sixteenth and one-eighth of an inch wide, bent so as to rest against the right cuspid and left lateral and right central incisor, but not in contact with the outstanding teeth at O, P. The drag-bands O, P are made to draw upon these outside teeth by the tightening of nuts on the screws, passed through the bar T, as shown, which at the same time causes the bar to press against the right central and left lateral incisor teeth, thus forcing a slight widening of the arch, indicated by arrows. Although this bar as represented is extensive, there are many cases, where but one tooth is to be moved, which only require a very short one, but it always should be of sufficient length to span enough teeth to prevent much movement of the anchorages. *L* represents an evener of two bicuspids, made of two bolts and two bars, which are made to bear upon the bicuspid teeth by the tightening of the nuts (*a*, *a*), which forces them in the direction indicated by the arrows. This is a unique apparatus, which, like the others, is simple, small, and does not interfere with the convenience of the patient.

(To be continued.)

PROCEEDINGS OF DENTAL SOCIETIES.

NEW YORK ODONTOLOGICAL SOCIETY.

(Continued from page 119.)

THE following paper was then read, entitled "Filling with Soft Foil," by J. Smith Dodge, Jr., M.D., of New York:

It is the purpose of this paper to describe and advocate a method of filling teeth with gold, which has been practiced for more than a hundred years, and from the rudest beginnings has grown almost to perfection. During this long time countless other means of saving decayed teeth have been suggested, of which some have become indispensable to the dentist, and others have fallen out of use; but the method of filling with soft foil has steadily held its own in every generation and every civilized land, has been quietly perfected by a long series of patient operators, and to-day is the only method which has the solid guarantee of fifty years' success. If it be asked what need there is of advocating a thing so well known and so successful, the answer is, that many dentists have not kept up with the improvements which have quietly and steadily been made in this process during the present generation, and have either retained it in its less perfect form or have supposed it to be obsolete. Therefore the writer aims to describe minutely the material, instruments, and manipulations by which fillings are made in this method that seem scarcely short of absolute perfection.

But two things must be emphatically said before we begin. *First*, it is by no means claimed that this is a universal means of saving decayed teeth. The writer fills teeth in at least four other ways, especially making large use of cohesive gold; and if he were limited to the kind of work which this paper will describe, would be obliged to condemn many valuable teeth which he easily saves. But within the limits which belong to it, the soft-foil method is believed to give better and more uniform results than any other ever in use. And, *second*, the writer disclaims any originality in that which he is about to describe. Doubtless he may mention and may value details which have grown up under his hand and are unknown to others; but so far as he knows, the credit of having perfected this process belongs to Dr. E. J. Dunning, of New York City, to whom the writer desires gratefully to record his own deep obligation, and, as he believes the future will prove, that of the whole dental profession.

The process before us consists in *forcing non-cohesive gold foil into a dental cavity with wedge-shaped instruments until the gold is compacted into a firm mass, owing its solidity solely to the resistance of the dental walls.* This definition would have been correct in John Hunter's time, and it is accurate still. In order to describe the details of the process, we will suppose a typical case and follow it from beginning to end.

Let us take a cavity on the anterior proximate surface of the first, right upper molar. The space belonging to the adjoining biscuspid is vacant. The face of the tooth either by nature or by use of the file is flat. There is a firm dental wall around the entire border of the tooth, and the cavity is of such moderate depth, and the dentine of such solid structure, that any desirable cutting can be done. All traces of disease having been removed, the cavity must now be shaped for filling, a matter which requires more precise forethought than if cohesive gold were to be used. It is desirable that the bottom of the cavity be nearly flat, or at least that any ridges be pared down. The dental walls should be nearly perpendicular to the surface of the tooth around the entire circumference of the cavity, with a slight undercut near the bottom, but with no deep excavations in these walls, and especially nothing that shall weaken the edge which will finally surround the filling. This edge must be tolerably regular and smooth; free from any chipping at the surface. If either decay or the dentist has made such a spot, it must be cut deep enough to become part of the general cavity. The especial point to be kept in mind is, that every part of the wall must have such shape and strength as to bear a firm lateral push without either breaking or letting the gold slip out. When all this is accomplished, the cavity is ready for filling. All the precautions against moisture which are necessary for cohesive gold are useful here. It is true that with care a filling can be made in this way under water which will last a long time. But it will not be the best that can be made; and those who have been accustomed to think lightly of the importance of using soft foil dry will be astonished at the greater ease and precision with which they can work when the rubber dam is used. I am accustomed to take precisely the same care in keeping dry as if every filling were of cohesive gold. And now, supposing the rubber dam to be in place, and the cavity and all around it to be thoroughly dry, let us next consider our gold.

It is necessary that non-cohesive gold be used, because the method of operating requires that each particle of gold should be free to move past its neighbors until its permanent position is reached. And the same consideration requires a high degree of flexibility or softness in the metal. These qualities have been familiar, time out of mind, in soft foil of low numbers. For many years I used nothing for this purpose but Abbey's No. 4, generally folding it into ribbons, or sometimes rolling up pellets. For a good many months past I have used exclusively Williams's cylinders of gold foil, style A, ranging in size from No. 3 to No. ½. But it is not intended to express here any preference for any maker's foil, nor even for any form of preparation. The principle involved simply requires that the operator introduce into the cavity from time to time masses of loosely-gathered foil, varying in size from a small pin's head to a large pea. And it is important that a variety of sizes be at hand throughout the operation, both to save delay and to prevent the temptation to use an improper size.

The instruments with which this gold is manipulated are of surprising simplicity, and every one of them terminates in a working-point which differs from all the others only in size. Four instruments form my working set, with four others for occasional use; besides which it is convenient frequently to borrow tools made for other kinds of work for the final condensation of the surface. But the work which insures success is done with one or more of the standard four. The largest of these lies before me as I write, and the following is its description. A piece of steel wire about five inches long and three-sixteenths in diameter tapers for a couple of inches towards one end, without being anywhere thin enough to have a perceptible spring under pressure. The part grasped by the fingers is octagon and file-cut, the maker's fancy, but of little importance. The working point is a double wedge, or very acute four-sided pyramid, one-eighth of an inch long, making at the apex an angle of from eight to ten degrees. This double wedge is set upon the shank at an angle twenty or thirty degrees greater than a right angle, its sides looking lengthwise and across the handle. The whole working-point is very accurately made and everywhere highly polished, without serrations or irregularities of any kind,—a matter of the utmost importance. The edges are left sharp, so that they will cut the finger-nail, but the extreme point is very slightly dulled. The whole tool, at a hasty glance, looks a good deal like a small foot-instrument, but the differences are many and essential. This is my largest size. I have a larger one, made some years ago for experiment, but it has long lain unused. The smallest size has so small a point that its exact shape can only be seen by very sharp eyes, but the form is the same, except that the shank is not slender in proportion; because there must be no spring under firm lateral pressure. The other two members of my working set are simply intermediate in size.

Now it will readily be recognized that this double wedge is a very old form of instrument. The extra large size which I have discarded, although it has precisely the form of those now used, is almost identical with instruments which my father used thirty or forty years ago. The claim of great improvement, therefore, does not rest on any novelty of form, but on a delicacy and finish which reduce what was once a question of muscle to a question of fine touch and trained manipulation.

The four others occasionally used have the same points, but the shank is bent at forty-five degrees about an inch from the point, for use in awkward lateral cavities. As they are sometimes used with a rotating movement, the handles are of ivory, half an inch or more through. There must be a pair, one having the point turned towards the handle and the other from it; and it is convenient to have two sizes.

All being now ready, let us make our typical filling. It is best to begin at the distant side of the cavity, that is, the palatine, and in the corner towards the gum. Probably there is already a slight angle there, but if not, it is well to cut one just deep enough to keep the first gold from rolling when it is pressed. With a plugger proportioned to the size of the cavity (in this case probably the largest, or the next) the operator picks up a bit of gold, perhaps half as large as the entire hole, and with a peculiar wiping motion of the instrument deposits it in the corner. Very commonly it will stay there, and oftenest under the most skillful hands; but if not, an instrument held in the left hand must retain it. The piece of gold is large enough to touch the bottom of the cavity and project a little beyond the edge. Now the operator with the side of his instrument and with a moderate force condenses it against the conical wall, not aiming at perfect solidity yet. Then another piece is inserted in the angle between the gold and the palatine wall, and similarly compressed towards its neighbor, and this is repeated until a row of pieces has been set along the whole palatine side of the cavity, sufficiently condensed to hold pretty firmly between the conical wall and that of the grinding surface. Now begins the peculiar feature of this method of filling. With the sides of the wedge-point the gold is patiently forced against the palatine wall, keeping an even face upon the side under the instrument by trotting the tool back and forth with a gradually increasing pressure. Especial care is taken to keep this face perpendicular to the surface of the tooth, and condense the bottom of the filling as much as the top. When no more impression can be made by the firmest pressure, there will still be seen a feather-edge of gold lapping over the dentine all across the bottom of the cavity. This must be carefully pressed back, tucked in, as it were, with a sidewise motion of the extreme point, until the lateral face of the gold is so flat and polished that it looks as if a filling had been sawed in two and half removed. Next, the side of the instrument is applied to the projecting surface of the gold and it is condensed nearly to the level of the tooth, so that the two surfaces of gold in sight make a right angle. If the first part of the process has been well done, this vertical pressure will not displace the gold in the least. Now there remains a cavity as at first, but smaller, with one wall of gold. Another layer of pellets is laid across from wall to wall, partly condensed in one direction as they are put in place, and made solid by pressure in the other direction after the row is complete. This process is continued until there remains only a small crevice between the near side of the filling and the dental wall. To fill this crevice successfully is the test of an experienced operator. It is sometimes filled with cohesive foil, but there is not the least need of that. If the cavity is deep the bottom of this crevice will be almost out of reach, and it must be made more shallow by simply packing small bits of foil directly against the bottom. Then the operator with a small instrument carries small pieces of gold one after another towards the end of the crevice, with vigorous pressure, until there remains simply a pin-hole. This he enlarges as much as possible with his points, pushing in every direction, and when all is solid about it, the final pin-hole is filled with one pellet of gold introduced to its very bottom with a peculiar wiping motion of the plugger which no words can accurately describe. This is followed by direct vertical condensation upon that spot, either with the heel of the plugger or with some other tool; and from that point the same process is extended over the whole surface of the filling. The older operators with soft foil relied much on this final surface packing, and threw upon it all the force of a powerful arm. But if the first manipulations have been carefully and patiently performed, very little impression can be made upon the surface afterwards. Indeed, the writer would undertake to make a large filling of the best quality without any surface condensation, beyond what can be made with the pluggers above described, held between the thumb and finger.

There remains only the finishing of the surface, which may be done by any of the usual methods. Formerly the burnisher was universally used, and was much relied on to give a final solidity to the filling. It may still be used where a glittering surface is desired, but I wish emphatically to say that it is no more necessary to these fillings than to those of cohesive gold. There is here no question of those soft-grained surfaces which many dentists suppose belong to fillings of soft foil. On the contrary, the operation above described produces a surface which will take any finish that can be given to gold plate. Files or corundum disks, stone or polishing powder, may be used upon it, and when all is done there remains a filling which cannot be distinguished from the most perfect filling of cohesive gold by any test short of removal.

Every dentist will understand that the description given supposes a very plain and easy case. Unluckily, such cases are the minority, and there remains a large list of difficulties in position and character of cavity. It would not be profitable to describe here the various ways of meeting these. But it remains to discuss the advantages of this method of operating and the limits of its application.

The advantages claimed are three,—perfection of fit, delicacy of manipulation, and rapidity.

If any one still doubts the perfect plasticity of gold foil, let him make a few light scratches on a smooth ivory surface and press a pellet of foil upon them. He will be surprised to see the accuracy with which every mark is reproduced. This is the process which is applied to the entire surface of the dental cavity, and the surface gold is backed up by a mass completely plastic and without elasticity until it has been perfectly compacted, by which time it is immovably in place. But the point to be emphasized is, that the process of adaptation is constantly under the operator's eye. When at last he looks at the finished filling, he does not merely see the surface and the closeness with which its edges fit the dental border, but he clearly remembers that at four or five different sections he has seen that the bottom of this filling was in perfect apposition with the whole contour of the cavity, and has with the point of his plugger secured an absolute fit from side to side. What better test of fit could there be than to saw through tooth and gold and critically examine the line of contact? And it is almost exactly this examination which the operator makes as he completes each stage of the operation described above. He dismisses the case, therefore, with the profound satisfaction of having seen for himself that the bottom of his filling fits. Doubtless this assurance may be had if so simple a cavity as that described is filled with cohesive gold. But this is because all parts of it lie open to easy reach. There is a large class of proximate fillings, however, which either involve much cutting of the tooth or must be filled in a sidewise direction, because another tooth is but little distant. Small cavities of this kind, made accessible by wedging, are among the most frequent in practice. For these the soft-foil method is especially useful. A sidewise movement is precisely what that method requires, and is the only one which such cavities permit.

The second advantage is delicacy of manipulation. I trust there are many here who will agree with me that the man who habitually performs delicate work will develop higher qualities than he who relies on main strength, and will become in every sense a better dentist. But this will seem to some far-fetched, and I shall not urge it. There are many cases in practice, however, in which the filling that requires least force is best; as, particularly, in lateral cavities of front teeth with thin anterior walls. Now, in the largest fillings this method of operating only calls for the force which can be given to an instrument held with the thumb and two fingers, as the pen is held in writing. And the high degree of solidity attained is reached because the mass is very plastic, every film of gold being free to glide past its neighbors, and because the force is concentrated upon a small point, that is to say, meets but small resistance. Multiply the condensing surface of the tool by eight or ten, and you must equally multiply the propelling force to get an equal condensation. Now, every dentist will readily remember cases in which this increase of force would be disastrous. Besides, in the operations I am advocating one can choose the direction in which he will apply almost all his force. Suppose a lateral cavity in an upper central incisor, with a thin anterior wall. This wall will bear very little pressure, but the palatine and cervical walls will stand anything. Now, if we begin at the posterior superior corner, and lay the rows of pellets along the cervical wall, bringing the last of each row gently in contact with the anterior wall, we can condense towards the neck of the tooth with full force, making the mass sweep along the weak border without much pressure directly against it, and delicately tucking the gold up to this wall until it makes perfect contact. The old method, which filled the cavity loosely and wedged outward from the center, would split this tooth long before the gold was solid.

In the third place, this is a rapid method. It seems long in the description, and in critical cases it is long in the doing. But taking the average office-work, an experienced operator will do his best in less time than by any other method with which I am acquainted.

Next let us consider the limits to the application of this method; for there are large and important classes of fillings to which it is wholly inapplicable. And as these limits are determined by the essential characteristics of the fillings so made, of course no dexterity can evade them. The filling before us consists of a great number of pieces of gold held firmly together by the resistance of opposite walls, and by nothing else. It is therefore rigorously necessary that every point of the filling should lie between two opposing walls.

Theoretically, two are enough; but in practice they are not. The directions are so many in which force is applied in mastication, and the repetitions are so frequent, that no filling of this kind is thoroughly safe unless every part of it is held by a double grip,—that is, between two pairs of opposing walls at right angles with each other. This condition is met only when the surface of the filling is nearly flat and surrounded on all sides by perpendicular walls; and this statement expresses the limits of our method. A little curve in one direction is not objectionable, so that excellent fillings are made on the exposed necks of incisor and canine teeth. And in long, narrow cavities, where a firm wall slightly undercut can be had on each side, the filling may follow almost any curve; as on the necks of molars. But the general rule remains that the surface must be nearly flat, with firm border all around. By this rule nearly all contour fillings are excluded. They can be made, but they are a waste of time and defraud the patient. They are exposed to great force and have but feeble resisting power. All those fillings are also excluded for which the cavity cannot be so cut as to give a hold all around and up to the very surface. This covers a variety of irregularly-shaped cases in all positions; but it is very important to remark that it practically excludes most fillings on grinding surfaces. In those cases where the teeth are perfectly flat on their grinding surfaces, I should have entire confidence in a soft-gold filling. But we have little to do for such teeth; and so long as any of the normal shape remains and the cavities lie between cusps, it is desirable, in my judgment, to *head over* the fillings,—that is, to carry them beyond the edge of the actual hole, so that the mass of gold, if removed, would show a projection like the head of a screw. In fact, it is exceedingly difficult to fill such a cavity without doing this; and if it is done with non-cohesive foil, there are unsupported edges exposed to the very greatest force of mastication. In the older practice these projecting edges, made with soft foil, gradually broke away, leaving the filling apparently projecting, although really no higher than it was at first; and the trouble was variously attributed to expansion of the gold or to crumbling of the enamel.

If, then, we exclude contour fillings and those upon grinding surfaces, what of importance remains? I answer, besides many cases otherwise very difficult on buccal and lingual surfaces, there remains almost the whole class of proximate fillings; a class which more severely tries the dentist's skill and oftener disappoints his hopes than all others combined. It is my firm conviction, deliberately formed and tenaciously held, that a habit of success in ordinary proximate fillings is more useful to the dentist and his patients than the most brilliant facility in contour filling. And I as firmly believe that the best road to habitual success lies through the use of soft foil in the way here advocated. The reason briefly is, that a perfect fit can more easily be made, and the dentist can more certainly know that he is making it.

There is one case in which these rigorous limits may be evaded with the happiest result. It is where one of the four required walls does not exist but can be supplied by cohesive gold. For instance, there are very commonly proximate cavities which furnish firm borders everywhere except that they run over upon the grinding surface. It is proverbial that these fillings fail along their cervical walls under almost any treatment. But they certainly do best at that point when soft foil is properly used. Such a filling may be begun precisely as in our typical case (only carrying the rows of pellets along the cervical wall), and brought within a little of the grinding surface. It is condensed laterally and faced down upon the proximate surface of the tooth. In a word, it is done, if only the missing wall were there. The operator then betakes him to his cohesive gold, gets secure anchorage somewhere in the solid ivory, and at the same time fills the fissure on the grinding surface and supplies the fourth wall required by the proximate filling. When all is complete, no eye can detect the line of union, and each part of the compound filling has that kind of work which best answers the indications of that part. And nowhere do the relative advantages of soft foil and cohesive gold more plainly appear than in such compound fillings. Soft foil, on the one hand, can be worked in mass and brought into gradual adaptation, the laminæ sliding past each other until the mass is solid; while it has no holding power except as it is everywhere grasped by unyielding walls. Cohesive gold, on the other hand, must not be worked in mass, but point by point, every particle being driven straight to the position in which it is to rest; while each particle holds its neighbor, so that if the mass be sufficiently fastened at one point it may with perfect safety be worked into any shape. Now observe how exactly these qualities suit the different parts of our compound cavity. The cervical wall requires the most perfect fit. In many cases it is remote, in shadow, and exceedingly difficult to reach with absolute precision. The attempt to cover it with cohesive gold, point by point, has been found by ample experience to give numerous failures; while no gold fillings stand so well just here as those of soft foil, because it can be gradually carried up across the whole breadth of the cavity, until the mass perfectly fits the wall. And, fortunately, the position does not at all demand the special property of cohesive gold, for there are walls giving abundant hold for the filling once made. But at the other end all this is reversed. The specialty of cohesive gold can alone fulfill the indications. Attachment must be secured wherever the tooth happens to be strong enough; a projecting angle must be made, and all the force of mastication sustained. Soft foil would be a conspicuous failure here, but then the case does not call for it; every point can be easily reached and a perfect fit obtained by direct adaptation. The total result is a filling which is peculiarly plastic just where plasticity is the special demand, and peculiarly strong just where strength is the one thing needful.

Here, Mr. President and gentlemen, the task which I had set myself ends. I have not offered you a universal remedy, I have not asked you to give up the present and go back to the outgrown past. For my part I would sooner abandon the practice of dentistry than be confined to the single method which this paper has defended. But believing that so difficult an art as ours cannot have too many resources, and observing that a dangerous tendency prevails to exclude and narrow down the methods of our work, I have thought it well to call attention to a process which had attained success before most of us were born, and which some of the ablest operators of our time have been proud to practice and to improve.

Dr. W. H. Atkinson. I had not intended to say anything on this subject, as I supposed it to be of sufficient interest to elicit animated discussion. I am proud of the papers which have been presented, and of their producers. They mark a very distinct advance in a beautiful and succinctly connected series of observations. The practical methods presented to us in them are such as have never been brought into such close proximity to my consciousness before. I coincide in general with the principles laid down in these papers, but I differ with these gentlemen in some of the deductions which they draw. Dr. Dodge has, I think, a misconception of both non-cohesive and cohesive foil. He entirely misapprehends the use of the terms, as practicalized in the case, by making the false deduction that these fillings would fall to pieces in small pellets, as they were put in, if you attempted to disintegrate them. That there is any difference in the practical result between a perfect plug, inserted in the cavity mentioned, made of cohesive or non-cohesive foil, I utterly deny.

Dr. J. Smith Dodge, Jr. I am not sure, but I think I have made more of these fillings than Dr. Atkinson ever did. I suppose from his remark that he does not practice filling in this way.

Now, as for this gold being converted into cohesive gold by pressure, the fact simply is *that it is not*. Sometimes fillings that look all right upon the surface, and evidently once were all right, are required to be removed on account of breaking away. I have had a number of such fillings, and carefully picked them to pieces. They did not come to pieces as easily as they were compacted together, but they did come to pieces in a very different manner than they would have done if made with cohesive gold. It is rather a singular deduction on Dr. Atkinson's part, in the assertion that the use of these slender instruments, just held between your thumb and finger, first converts non-cohesive gold into cohesive, and then compacts this cohesive gold until it makes a solid mass. The criticism which the doctor made upon my process of reasoning will apply admirably to his process of reasoning.

I rose to state that in the case I have presented there is no conversion in it of non-cohesive gold into cohesive gold. How many times would you have to pass it through the rolls to effect that? You cannot do it in that way,—there is something on the surface which will not let it cohere, and in order to get that something off the gold must be heated or submitted to acid. I occasionally make a mistake and get hold of the wrong lot of foil, and I do not get many pieces in before I see that they will not slide past each other; they stick. You cannot make a filling of cohesive gold in the manner described in my paper. If you do there will be hollows, pits, and air-holes to work mischief soon enough. I insist that I have not misrepresented this process, either intentionally or unintentionally.

(To be continued.)

FIRST DISTRICT DENTAL SOCIETY.

Incidents of Office Practice.

Dr. R. M. Reynolds. This day I have had a case of this so-called Riggs's disease. The case I treated two years ago, and here is a tooth I filled and was obliged to remove. I would like to have the gentlemen examine it. It is entirely free from tartar. I found it in that condition about a month ago, when I removed it.

Dr. J. S. Latimer. It takes some courage to get up and confess, and yet that thing I feel called upon to do for the benefit of others. I had a patient come to me recently with two exposed pulps. The cavities were on the adjoining proximate surfaces. I applied arsenious acid (having the rubber on both teeth) in small quantities, laid a little piece of absorbing paper over the arsenic in each, and not only filled the cavities with plaster of Paris, but allowed it to remain connected between the two teeth. I have used plaster of Paris for this purpose for years, and it is a good covering, but I don't know that I ever before left the connecting portion between the two teeth, and I will never do it again. I advise you not to do it. The septum between those two teeth I found dead. The patient was a very timid one, and cried out at the thought of being hurt. I took a large hatchet excavator and cut that dead portion away, and I expect that the teeth will get tolerably comfortable, but the Lord deliver us from that mistake again.

Dr. Atkinson. Use no more arsenic again.

Dr. Mills. I would like to name an incident that is interesting to me, from the fact that I have heard the statement made by Dr. Atkinson, of cutting off the roots when the pulps were alive. This case came in my hands a short time ago. A tooth I had filled nine years ago; a tooth that was filled with judgment. I filled it with osteoplastic, or the white filling, and it has remained up to this time. I repaired it only once in that time. I found the pulp exposed, and I was obliged to cover it,—it seemed to be congested,—I thought I would take my chances. It was a superior lateral incisor. I repaired the filling, and it went nearly three months, when the lady came to me with the tooth broken off, and I found the pulp was living in the root. She was a young lady twenty-three years of age. I hardly knew what I would do. I covered with cotton, and in the mean time I saw Dr. Atkinson and asked him how to get rid of the pulp. He told me; so on Monday I got ready, and did as Dr. Atkinson suggested. I took the steps that came as I went along. I found I was not going to be very successful, and so while I was thinking the thought suggested itself that I would take the small wheel-bur, and so I had the young man put the bur in the engine, and I took it, and I gradually carried it to the pulp, and let it touch as lightly as possible, and it got in about a quarter of an inch, and by some good luck it caught the pulp and twitched it off. The rest of it was remaining. It was bleeding then. I went on with the treatment, and put in a pivot,—a tooth with a chamber pivot,—for the purpose of watching it. I have seen it twice in the last four weeks, and everything is successful.

Dr. Allen. Did you treat the pulp?

Dr. Mills. With creasote simply.

Dr. R. M. Reynolds. Did you allow the pivot to come to the pulp?

Dr. Mills. Not to the pulp; just short of it.

Dr. Atkinson. Speaking of the specimen presented by Dr. Reynolds, it is not fracture, but it is absorption, and he who would determine which it is has simply to look close enough to see whether it is the result of mechanical action that fractured it one way, and only follows the line of the fibre in the structure the other way.

A paper was read by Dr. W. H. Atkinson, entitled "Molecular Constitution of Protoplasm."

Dr. Odell. In the most excellent paper just read, Dr. Atkinson supposes that all possible combinations of atoms will probably be made up of seven times sixty-nine; being the number of known elementary substances multiplied by their sevenfold bonds of affinity.

Dr. Atkinson. I said that was now what we knew; and if the gentleman's attention had not played him false, he would remember that I said a friend suggested the proper number for ultimate completeness to be 72 or 84.

Dr. Odell. Well, I think either statement probably wrong. I figure that a monad atom would put out one bond of affinity, a diad two, and so on up to a septad, which puts out seven (and which is all we profess to know anything about).

Dr. Atkinson. Do you know any atoms that have seven bonds of affinity,—any septad atoms?

Dr. Odell. No, sir; the "Chemistry" knows it.

Dr. Atkinson. Ten dollars for that book!

Dr. Odell. I can produce it. It is indorsed "Barker's School Chemistry," and another, "Fownes;" in both are mentioned septad elements or atoms.

Dr. Atkinson. Does he give a list of them?

Dr. Odell. I think so; however, that is not the point which interests us most in this connection.

When you said seven times sixty-nine is probably the number of possible combinations, it struck me that it would be a most beautiful simplification of atomic combinations, and indeed would bring them all within the grasp of the finite mind if they could be all comprised in the comparatively small number of seven times sixty-nine; so that we could analyze them; so that we might know just where we stand, and be enabled to memorize them.

But if, as I stated, monads put out one bond, and so on up to septads, which put out seven, which you see by simple multiplication (involution) will be (5040) five thousand and forty; now it occurred to me that the whole (69) sixty-nine elementary substances, not being capable of uniting with the whole list, estimating the half of that number as being so capable, we would have as the probable number of possible combinations, sixty-nine (69), multiplied by the half of sixty-nine, multiplied by five thousand and forty; a number (11,997,720) which, so far as the possibility of assimilation and arrangement, let alone complete digestion, by the mind of man is concerned, borders on infinity.

Dr. Atkinson. I would call the attention of our secretary, and yours, gentlemen, to the fact that monad, diad, triad, tetrad, pentad, hexad, and septad are not permanent nominations, neither is any one of these. To all intents and purposes any single atom may be capable of any degree of combination, according as these bonds of affinity are awakened; but until we shall be able to show that a certain set of atoms never had been, or can be, aroused into union, excepting by the engagement of only *one* of their bonds, are we entitled to say that any *one* is not a septad; that is to say, a positive septad. We cannot talk anything about the possibility of combinations as presented to our practical research until we shall have surveyed the field, and all the fields of nature. Hence the caveat; when we have surveyed the field, we will not know in part; then we will not believe in part, and we will have the full illumination of complete demonstration; that will give us the key by which we shall be able to account for every form of combination and separation of these bonds. This is a very charming subject, and one that lies at the foundation of our judgment, as to whether our patients are in a healthful or other condition. It is but the building up or taking down of the tissue structure in the body that constitutes our capability for the work of the functions of life. There is no tissue in the body with which I am acquainted which does not change its character. excepting the tissues of the teeth; and only two of these,—the enamel and the dentine.

Prof. S. P. Andrews. The first requisite in order to a lucid understanding of any doctrine is a clear conception of the significance of the first discriminations that are used; and in order to understand Dr. Atkinson in relation to any part of this very large subject that he is so pre-eminent in, I think the first thing needed is a clear understanding of the meaning which he assigns, correctly assigns, to the terms atom, molecule, and mass. Perhaps you would hear him more often say atom. molecule. and granule; but granule is simply the first and lowest exhibit of mass. If we take these three terms and study them until we become familiar with the significance of each, we shall have a sort of A B C of all Dr. Atkinson is talking about. He has defined the atom, and I would call your attention to it as the primal singleness, the lowest and least conception that we can possibly have of anything that is; whatever really is, whatever has an existence, and nothing but the lowest sort of existence. is what I mean by an atom. The molecule is then an ideal,—this atom is merely ideal to us. It is below the range of physical observation even by the microscope. We don't see atoms when we use the microscope; so, then, a combination of atoms into a group constitutes a molecule, and a molecule is still purely ideal in the sense that it is not revealed by the telescope. It is not what we see physically, but something the existence of which we are compelled to think by our experience. First we are compelled to assume the existence of the atom, then we are compelled to assume all combinations or combined groups of those atoms, and then a combination of these again constitutes the granule, which is the first, or lowest, or least thing which is perceptible to our senses; the first, lowest, and least thing that we see under the microscope is granular; and the massing of these granules constitutes what we call the mass. If we see something exactly correspondential with all these right around us, if we can go into some other sphere than physiological and find something that repeats these discriminations, we shall have a great help in fixing them in our imaginations and memory, and this we can do, I think, by passing from the consideration of the human body to the consideration of society, human society as a body.

Swedenborg called all society the grand-*man;* we say collective-man sometimes, and the collective-man or mankind gives us the science which we call "sociology," and that has been correlated with physiology in a way that I think I am going to point out, and I believe that it will be when physiologists study sociology, and sociologists study physiology, and when they preserve the correlation or relation between the one and the other clearly and distinctly, that each will have a great light upon the subject to which he is educated. Suppose we say that the individual man or woman or child,—the individual is the atom of society, and then that the family is the molecule of society, and that within any given consociation of society, church, or sect, or party, any body, what we call the mass of society, the mass meaning people in their various aggregates, exactly corresponds with the mass in the mechanical sense. The tissues and organs of which the body is composed,—the least form of these social aggregates before the family, and the sect, as the Methodists or Presbyterians, or a party like the Whigs, would correspond with the granules, and then we have got to some real mass of human beings, so that they crowd upon our observation.

As society is so much a larger thing than the individual body, the molecule, which is the family, and the atom, which is the individual, in society are visible to us, so that we have the advantage of bringing the atom and molecule out of their condition of pure ideal existence into an obvious presentation to our senses when we go over to the domain of society, and so we can pass from society and its consideration out and up to the world as a whole, and there we have an atomic science, which is chemistry; and we have a molecular science, which is physics; and we have massive science, which is mechanics; and these three aspects of bigness and littleness, or of minism and magnamism,—these three grades correspond again with three presentations which the universe makes to us, which I denominate *micro*scopic, which is the least, for that view which is presented by the microscope; *macro*scopic for that view which is presented by the telescope, and *conio*scopic for the intermediate aspect of things as presented by the natural eye. I suggest those three terms; that is all, I think, it is better to say at present.

Thoroughness in Dental Operations.

Dr. J. S. Latimer. The subject is an important one, and one that ought to receive our attention. I will say that we had an illustration of thoroughness this afternoon in Dr. Mills's operation; the whole time employed in his clinic was in the removal of tartar from four teeth. If any time be spent without thoroughness, this operation must necessarily be a failure; and yet the difficulties in the way of complete success are very great, especially well down at the apices of the roots; and I wish to say that I commend most heartily the thoroughness with which the operation, so far as I could see, was performed; the patient persistence which made him continue to work, work, work, on those teeth until he got them, as he supposed, right; and in whatever we do, whether in excavating or treating, we must learn to be thorough, to be patient, to be persistent, to be careful, and cautious. For my part, I wish to say that I do not commend the practice of immediately filling teeth that are abscessed or have exposed pulps, filling them permanently and sending the patient home with the hope and expectation that there will be no further difficulty. It is rarely the case that we may put in a filling that is not a test filling, that may last a month or two months, and should give the patient's purse the benefit of the doubt. I think it is thoroughness to be cautious and painstaking in that particular. It is not thoroughness to put in expensive gold fillings when we have not given the tooth the test of time and proved that it is well. I spoke at our late meeting of the necessity of thoroughness in filling with amalgam, in having the patient return for the completion of the smoothing and polishing of the filling, and I wish to say here that amalgam fillings will do very much better if thoroughly smoothed and finished.

Dr. Atkinson. I wish to make reference to some remarks that have been made, because we are apt to follow in the lead of men who are evidently honest and earnest, irrespective of taking into consideration the other quality of efficiency. I don't care how honest a man is, if he is not intelligent upon the subject upon which he speaks he is not a fit person to follow. I don't care how intelligent a man may be, if he is dishonest he is not a safe leader; and it is my deliberate judgment that the advice in some cases here, where pulps have been extirpated but no periostitis present, is worthy to be catalogued among the nesciences. Why do I say that? Simply because if it is disintegrated, there never will be so favorable an opportunity to avert action and make a complete success of filling that tooth permanently. Then I suppose the cry has been that the person was to do damage by going through the end of the root into the territory about the end of the root, when the abscess would be aroused into activity. Is there any possible advantage to be derived by taking out that filling and going in and treating? Does not every man that understands the physiology and pathology of the teeth know that it is more wise to lift the lip and go through the alveolar process, and let out the dead molecules, and allow the process to be remanded back to Nature's domain, and she will take care of it? Now, as to the destruction of the pulp. You know how my soul yearns for you all in that regard, and how I am so dead against thoroughness with weakness, without it be that you be so thorough that your weakness shall dash back into your face, and you will get such a repentance that you will walk in the way of life. Don't apply arsenic to the human mouth. If you give arsenic at all, give it in a solution by which it can be carried away. We have had an example to-night that ought to stand as a caveat against going in with any such dangerous agents. Never put it there! If there is only half of the pulp alive, let the half left be resuscitated and helped to perform its work.

Dr. Wm. M. Reynolds. Nearly two years ago I got the idea from Dr. Atkinson that the most thorough was the best way to treat those teeth, and since that time I have been in the habit of going through the apex of the root, in cases where it was possible to make an opening through the buccal or anterior surface of the alveolar process, and cleansing out the part with the syringe, forcing water through and filling permanently. In a number of cases that I have not treated in this way, they have been worse than when treated in this way. I have in my mind three cases. One I treated one way, and the others, the other. There was no apparent difference in the condition of the teeth. One I filled permanently, and the other I filled temporarily. The one filled permanently has given no trouble, although filled a year ago. The other I refilled three months ago. I would have more success in that way than in any other.

Dr. J. S. Latimer. I presume the doctor has reference to those cases in which the pulp has died, and the pulpless teeth have been filled with amalgam.

Dr. W. M. Reynolds. The pulp has been removed in the case referred to. The bur has not been passed through the apex of the roots.

Dr. Odell. Among my thirteen hundred families (laughter) for whom I have operated for the last seventy-five or eighty years, I have noticed that most of the fillings put in were gold fillings. A great many of them, a certain percentage, two per cent., six per cent., I don't know the exact rate, were amalgam. None of them were osteoplastic, nor Hill's stopping or gutta-percha, nor any tin-foil. On looking over the list of these operations, and looking over the mouths when the patients return to me. I find that out of these thirteen hundred families, I won't say that not five teeth have been lost, but I didn't have any trouble with these fillings worth mentioning. It is only in the very soft teeth (which we all dislike to see at the very first sitting) that I am very much troubled. In that case I can refill frequently with gold, quite as well as Dr. Flagg told us he could with Hill's stopping or gutta-percha. He punched a little hole in the side of the gutta-percha and stuck in a little more gutta-percha. I punch a little hole, if necessary, alongside of the filling, and put in a little more gold, and I don't see but that they stand as well with gold as Hill's stopping. When we speak about thoroughness, I do find that in the various little bottles having specimens of all the first-class dentists' operations in them, which you (won't) find in my office, that many of the troubles that have arisen have been from a want of thoroughness in operation, and not from material. I have found splendid gold fillings, put in, in some cases, by the very best men who ever handled a plugger,—as good as the best,—decayed at the cervical margin, sometimes away under the margin of the gum, where they have no business to decay at all: the reason being want of thoroughness, not the gold at all! No electricity at all! Where does the want of thoroughness come in? In not finishing the cervical margin of the filling flush with the surface of the cervix of the tooth. What is the result of that projection? It admits air and water and food, and don't admit of the gum returning to its natural position.

Dr. C. E. Latimer. I think we are very often mistaken in our examination of those cases. A filling may be finished as perfectly as it can be done, out to the cervical border, and food will lodge there just as it did before. The same cause exists which produced caries in the first place, and the vulnerable point being at the junction of the gold with the cementum or enamel we find caries recurring. If we want to be thorough in those cases, I believe we might cut away the cervical border and carry the gold above the margin of the gum. Dr. Perry was speaking about that only a short time ago, and he said where he had done so, cutting away the cementum and carrying the gold up so as to effectually protect the part exposed, he was successful. We don't like to do that. It makes it more difficult to apply the rubber, and we naturally shrink from sacrificing sound tooth-structure. When such cases begin to decay we put in an excavator and catch a corner or shoulder of gold, and we say to ourselves, that operator did not dress down that filling, and did not finish it thoroughly; whereas, the operator may have been just as careful and conscientious in doing his work there as any body could be. We should not harshly criticise such an operation. We cannot tell the condition it was left in, but so sure as there is space there will be lodgment of food, there will be decay, and the margin of the gold will project. I said at the last meeting that we might be too thorough in some directions. I used to think every filling must be malleted. I made a great many fillings, malleting gold where I could not drive it toward a wall. I now mallet where I can drive toward a wall, but never where I cannot get the instrument directed at some angle toward the wall, because I would make a leakage on the anterior wall, and have a little black line there. Again, I thought every root I filled ought to be filled with gold; that, I thought, was conscientious work. I spent a great deal of time and caused annoyance that I ought to have saved my patients. I remember trying as a substitute for gold, in canals I could not reach, and in small canals where I could not get gold filling in satisfactorily, small broaches of platinum, driving them in after winding them with gold, and I thought I was doing thorough work. One operator in our city who stands well in the profession, who is present to-night, found a tooth I had filled with the end of the platinum broach sticking through the end of the root. He extracted the tooth, and condemned in very severe terms that operation,—justly so. I was going too thorough; I did mischief. Now I don't try to fill such roots with platinum broaches. I don't try to mallet gold into the roots of teeth excepting the straightest possible cases. Nearly every root I have filled for the last four or five years I have filled either with oxychloride of zinc or gutta-percha. This does not seem quite as thorough as filling with gold, yet I believe I make better fillings, do my patients better service, and I save them a great deal of annoyance, time, and inconvenience. I don't fill large cavities as I used to. I only a few days ago looked over my old books and recalled the largest filling I ever introduced, filling a superior molar almost from the roots down, and it took a long time; it was a very tedious operation, and if I had built the crown down with amalgam, or made a gold thimble after Dr. Perry's plan, and fastened it on, I should have done the patient a great deal better service; I would have saved him three or four hours' pain and inconvenience, and should have given him a better operation. I know I am serving my patients by cutting short this operation. Dr. Odell took me to task for using gutta-percha. Nearly all my temporary fillings are not the red gutta-percha, but the Hill's stopping, containing hardening material enough to make it wear well. Again, in regard to cheapening operations, I believe we do harm in the profession by demanding such prices as the poor cannot pay. When I have a case that is truly a charitable one, perhaps a shop-girl or a clerk in a store earning only a small salary, I look over the mouth and say, I will give you an engagement at some time that will not interfere with my regular appointments, and I have them come in the evening or between appointments as far as I can. I work evenings a good deal, because they can better afford the time. I work as rapidly as possible, telling them, "It will hurt you a little more, but I must work rapidly in order to cheapen the operation for you.' I excavate the cavities rapidly by using the same instruments so far as I can, taking out the decay just as thoroughly as I would for the Queen of England. For all of the back teeth, especially if the cavities are large, I take amalgam, and wash it thoroughly with bicarbonate of soda solution as I mix it. The cavities may be very large, but, if the pulps are not exposed, I can fill those half-dozen cavities in probably the time that would be required to fill one with gold; but I do that patient better service in that manner of working than I could by using gold three or four evenings. I save more teeth and charge them a very low price. That is not thorough work, is it? Certainly it is not such as I should wish to be judged by in the profession.

Dr. Mills. I am satisfied the most important duty next to good work is to instruct the patients in the care of the teeth. A careless patient will undo a great deal of good service. I find the more I instruct them in the care of their mouths the more I have done to help them to save that which I do for them.

The point which I think is neglected is in the line which I demonstrated at the clinic this afternoon. I have been very well satisfied, more particularly in the later years when my observation has taken a wider range, that the greatest neglect is in that one department. I think I can with certainty make the statement that the matter of the health of the teeth is entirely overlooked as a general thing in practice. We have done a great deal in the way of progress; the operations of filling teeth have been very much perfected. Those who remember fifteen or sixteen years ago, when in the American Dental Association the blow was struck against the wholesale destruction of teeth, will recall how that resolution was commented upon very generally by the profession. We know that saved thousands of teeth to the people. Then the next step was the preservation of the pulps, and we are all familiar with that history, and we save a great many pulps to-day that ten years ago we would have destroyed. Now a large proportion of our better practitioners are coming to a desire to save pulps, which shows a possibility of saving pulps beyond that which we had supposed. We have gained a success in preserving the vitality of the teeth by saving the pulp. We have, however, neglected this other thing. We have got to meet this question of the ill condition of the teeth caused by encroachment of the salivary calculus. The importance of this thing has got to be brought before the profession just in the same way as were the arguments which have resulted in the advanced steps already made, and I am satisfied that the time is not far distant when its necessity will be seen.

There is something else important in connection with this matter, and that is, what a terrible effect it must have upon the general health. I can hardly understand how it is possible for a man to live with such a condition of the mouth as we had in the case this afternoon. I contend that the only reason why that man is living at all is that he has an organization able to overcome this condition of his mouth. I am satisfied from the observation I have had and from testimony that persons have actually died from such causes. I have had such cases. I have a case now which convinces me of all the statements I have heard before. I am satisfied that it has very much to do with the general health.

Adjourned.

MASSACHUSETTS DENTAL SOCIETY.

The Massachusetts Dental Society held its thirteenth annual meeting on Thursday and Friday, December 13th and 14th, 1877, at the Tremont House, Boston. The attendance was large, and the several sessions were of unusual interest. Some of the members are engaged in original investigations with the microscope, and otherwise, the results of which were fully presented and discussed. The following were elected officers for the ensuing year:

President.—Dr. J. H. Kidder, of Lawrence.

First Vice-President.—Dr. C. G. Davis, of New Bedford.

Second Vice-President.—Dr. G. A. Gerry, of Lowell.

Recording Secretary.—Dwight M. Clapp, of Boston.

Corresponding Secretary.—Dr. T. H. Chandler, of Boston.

Treasurer.—Dr. Edward Page, of Boston.

Librarian.—Dr. F. M. Robinson, of Boston.

Microscopist.—Dr. R. R. Andrews, of Cambridge.

Executive Committee.—Dr. J. H. Batchelder, of Salem; Dr. N. W. Hawes, of Boston; Dr. J. T. Codman, of Boston; Dr. G. F. Waters, of Boston; Dr. C. H. Osgood, of Boston.

Orator.—Dr. J. Searle Hurlbut, of Springfield.

Substitute.—Dwight M. Clapp, of Boston.

Dwight M. Clapp, *Recording Secretary.*

VERMONT STATE DENTAL SOCIETY.

The annual meeting of the Vermont State Dental Society will be held at the St. Johnsbury House, St. Johnsbury, Vermont, Wednesday, March 20th, 1878, at 7 o'clock P.M., session to continue through the next day.

Chas. D. Newell, *Secretary.*

EDITORIAL.

THE NEW DEPARTURE.

A very general interest is being manifested by the dental profession in the theories and practice which have come to be comprehensively designated as "The New Departure." The action of filling materials upon dentine, as promulgated and ably discussed and advocated by Dr. S. B. Palmer, of Syracuse, N. Y., the result of earnest scientific investigation; the indorsement of his conclusions by Prof. Henry S. Chase, of St. Louis, and Prof. J. Foster Flagg, of Philadelphia, as the result of their observations and experiments; the modifications which these gentlemen are advocating and practicing, the outcome of these theories and deductions,—these constitute what is termed "The New Departure."

Both theory and practice are so essentially, so radically, so diametrically in opposition to the theory and practice which have so generally obtained, that it is quite permissible to designate them by way of distinction as the "accepted" creed and the "new departure" creed.

Whatever conclusions are finally reached, and whatever may be the practice of the future, it is at least evident that much discussion will result from these radical expressions of opinion.

For the purpose of definitely informing our readers of the points at issue, we publish the two creeds in juxtaposition.

The unanimity of thought in this matter with which the three gentlemen named are credited, may be appreciated from the statement that the New Departure creed having been drafted by Prof. Flagg, and submitted by him to Dr. Palmer and Prof. Chase for revision, received their written indorsement without modification.

Accepted Creed.	New Departure Creed.
I. Gold is the *best* material with which to save teeth.	I. In proportion as teeth *need* saving, gold is the *worst* material to use.
II. Either "contour filling" *or* "separating teeth" is the best method to arrest decay.	II. Neither "contouring filling" nor "separating teeth" has much to do with the arrest of decay.
III. Failure in operations is mainly due to defective manipulation.	III. Failure in operations is mainly due to incompatibility of filling material with tooth-bone.
IV. A tooth that is worth filling at all, is worth filling with gold.	IV. A tooth that can be so treated as to be satisfactorily filled with *anything*, is worth filling.
V. "Unskillful and unscrupulous" dentists fill with tin covered with gold, *thereby* causing galvanic action, pulpitis, death of the pulp, abscess, and *loss of the tooth.*	V. Skillful and scrupulous dentists fill with tin covered with gold, *thereby* preventing decay, pulpitis, death of the pulp, and abscess, and *thereby saving the tooth.*

VI. A filling, to be *good*, must *not leak*.	VI. A filling may be the *best known* for the tooth, and yet *leak badly*.
VII. Gutta-percha, *properly used*, is good enough for *temporary* fillings.	VII. Gutta-percha, *properly used*, is the *most permanent* filling material we possess.
VIII. A *good* gutta-percha filling, in its proper place, is better than a *poor* gold one.	VIII. A *poor* gutta-percha filling, *in its proper place*, is better than a *good* gold one.
IX. Amalgam, *per se*, is a *poor* filling material.	IX. Amalgam, *per se*, is an *excellent* filling material.
X. The use of "plastic" filling material tends to lower the standard of dentistry, thereby diminishing its sphere of usefulness.	X. The use of "plastic" filling material tends to lower that dentistry which has for its standard of excellence "ability to make gold fillings," but very much extends the sphere of usefulness of that dentistry which has for its standard of excellence "ability to save teeth."

BIBLIOGRAPHICAL.

HAND-BOOK OF THE PRACTICE OF MEDICINE. By M. CHARTERIS, M.D., Professor of Practice of Medicine, Anderson's College, etc. With Illustrations. Philadelphia: Lindsay & Blakiston, 1878.

This volume, a 12mo of 336 pages, inclusive of contents, appendix of formulas, and index, gives the definition, etiology, symptoms, course and progress, morbid anatomy, diagnosis, prognosis, and treatment of all the diseases usually discussed in the more elaborate volumes upon the practice of medicine. The space allotted to the consideration of these details of the various diseases may be appreciated by the fact that the eruptive fevers, including smallpox, vaccinia, varicella, scarlet fever, and measles, are disposed of inside of fifteen pages. Those who do not desire or cannot afford the more bulky and more expensive treatises may find this a "handy" reminder of the general facts connected with the subjects discussed.

PRACTICAL GYNÆCOLOGY. A HAND-BOOK OF THE DISEASES OF WOMEN. By HEYWOOD SMITH, M.A., M.D. OXON., M.R.C.S., etc. With Illustrations. Philadelphia: Lindsay & Blakiston, 1878.

This volume claims to be an epitome of gynæcological science and practice; a condensation systematically arranged, and giving at a glance the salient points of this important branch of medical practice. In a single page—frequently in one-half or one-fourth of that space—are given the definition, causes, symptoms, signs, diagnosis, prognosis, and treatment of a given disease. This excessive conciseness must obviously limit the usefulness of the volume, and assign it a place among the books whose chief value is in the facility they afford for immediate reference. As such an epitome or compend we know of no other so complete and reliable. A list of remedies and a comprehensive index are appended.

OBITUARY.

PROF. GEO. T. BARKER.

At a meeting composed of the members of the Odontological Society of New York and its invited guests, held on January 15th, 1878, to pass resolutions relative to the death of Prof. Geo. T. Barker, of Philadelphia, Dr. Lord was, on motion of Dr. Ambler, made president.

Drs. Francis, Dwinelle, Perry, Ambler, and Bronson were appointed a committee, which, on motion of Dr. Jarvie, was instructed to publish the resolutions and the minutes of the meeting in the dental journals, and to send a copy to the family of the deceased and to the faculty of the Pennsylvania College of Dental Surgery.

The committee, therefore, in accordance with the above instructions, respectfully present the following:

Whereas, Learning with deep regret and sorrow of the death of our friend and professional brother, Prof. Geo. T. Barker, of Philadelphia, in the prime of his manhood, and of his usefulness to the dental profession and to humanity; therefore

Resolved, That we appreciate the upright, conscientious, and earnest services of Prof. Barker, and remember with feelings of gratitude and admiration his eminent ability, his untiring research, and his candid and generous action in all matters pertaining to the world of professional thought and investigation.

Resolved, That our regret for his untimely decease is lightened by the remembrance that his services to dentistry will insure that his name and memory will always occupy an honorable and distinguished place among those of our profession whom we all delight to honor.

Resolved, That our sympathies, true and heartfelt, are hereby tendered to the family, relatives, and friends of the deceased in this sad and inscrutable dispensation of Divine Providence.

Resolved, That we tender to the Faculty of the Pennsylvania College of Dental Surgery an expression of our deep sense of the loss they have sustained in the death of him who has been so long associated with their institution and its interests.

[Signed]
Charles E. Francis,
Wm. H. Dwinelle,
S. G. Perry,
J. G. Ambler,
Wm. A. Bronson,
Committee.

E. A. Bogue, *Secretary.*

New York, January 18th, 1878.

RESOLUTIONS OF RESPECT TO THE LATE PROF. BARKER.

At a special meeting of the students of the Pennsylvania College of Dental Surgery, held January 12th, 1878, the following resolutions were unanimously passed:

Resolved, That we have received the news of the death of our friend and preceptor, Prof. Geo. T. Barker, with profound sorrow.

We desire to express our sense of his abilities as a teacher, and our appreciation of the marked interest he ever manifested in our progress.

We have found him faithful in the performance of his duty towards us, stimulating us to exertion by his directness of purpose, his thirst for knowledge, and his indomitable industry.

The professional life of Dr. Barker has been so closely identified with the Pennsylvania College that his name must ever be cherished with affectionate regard by those in any way connected with this institution.

We feel a just pride in the widespread reputation he enjoyed, based as it was in a large measure upon his labors in the College.

His works will be his enduring epitaph.

Resolved, That we attend his funeral in a body; and be it further

Resolved, That these resolutions be published in the Dental Cosmos and the principal morning and evening papers of the city, and that a copy of the said resolutions be sent to the bereaved family.

[Signed]
J. K. Pattison,
W. D. Miller,
J. Hammond Cambell,
W. A. Cortwright,
H. Poate,
} *Committee.*

Edward C. Kirke, *Chairman.*

DR. GEO. J. BARCLAY.

Died suddenly of hemorrhage, on January 22d, 1878, at No. 41 E. Ninth Street, New York City, Dr. Geo. J. Barclay, of Pittsburgh, Pa., in the fifty-third year of his age.

Dr. Barclay was one of the few who have devoted themselves exclusively to the treatment and preservation of the natural teeth. He was a contour-filler of the first rank, a kindly and courteous operator, and jealous of professional character.

He was on his return from a four months' tour in Europe, and was visiting his long-time friend Dr. Atkinson. The finest clientele of Pittsburgh will sorely miss him.

PROFESSOR HENRY REGINALD NOEL.

Died, of pulmonary consumption, at his farm, in Virginia, on January 26th, 1878, Prof. H. R. Noel.

Dr. Noel was born in Virginia, and was a graduate of her university. He located in Baltimore in 1858, and was elected Professor of

Physiology in the Baltimore College of Dental Surgery, in 1865. He served during the war as surgeon in the Confederate Army.

Dr. Noel was a frequent contributor to dental and medical periodical literature. He was widely and favorably known as an earnest worker, a close observer, a skillful practitioner, and a genial, conscientious man.

PERISCOPE.

CHANCRE OF THE LIP—WAS IT COMMUNICATED BY A DENTIST'S INSTRUMENTS?—Some time since Dr. F. F. Maury gave me the opportunity of examining a patient under his care, with the following interesting and unusual history: A. B., a female, aged twenty-six, is a thoroughly respectable housemaid, modest in her bearing, and her character vouched for by her employer, a physician, in whose family she has been for years. She says she never had any serious illness, and her appearance is strongly corroborative of her statement. Although aware that she has now a grave disease, she does not know its specific nature. In the month of September, when in perfect health, she suffered with a severe toothache, for the relief of which she applied to a dentist. He put some cotton, bearing an anodyne, into a cavity in one of her teeth, and advised her to have the nerve extracted and the tooth filled. A week later she returned, and he made an application to destroy the nerve. Still a week later he completed the operation, and recommended her to have all her teeth cleaned. To this she consented, and he did it.

At this time, two weeks from her first going to him, the angles of her mouth were much irritated by stretching, and she had observed a small sore near the middle of her lower lip. This the dentist said was only a blister, and advised the application of alum to it, which she carried out. However, the effect seemed evil, and the sore developed in about ten days into an angry, indurated ulcer, half an inch long, and of a somewhat less width, with a yellowish deposit, and an accompanying enlargement of a left submaxillary lymphatic gland. The ulcer and the bubo were both, she says, excessively painful.

Her condition now attracted the attention of the physician in whose family she was serving, who diagnosed a chancre, applied locally an ointment containing the nitrate of mercury, and gave her internally iodide of potassium and iodide of mercury, combined with opium.

The disease then passed on, with malaise and fever, to a general papular eruption, and the woman came, about five weeks after first going to the dentist alluded to, under Dr. Maury's care. She was, at the time of my first examination, ptyalized; on her lower lip was an enormous chancre, surmounted by an ugly excavated ulcer, an inch and a half long by about half an inch wide, with angry-looking, indurated and everted edges, and covered with a nasty yellowish deposit. Below the angle of the left lower jaw was a large and painful bubo. She had a general but not profuse papular syphiloderm. Many of the papules were developed in her palms and soles. On inquiry and examination there appeared to be no other syphilitic manifestations.

Under treatment the ulcer was, after two weeks, reduced one-half; but there was appearing a very painful pustular syphiloderm. This began upon her shins and calves, and came afterwards, though less severely, on her arms and face. Two weeks later she had sore throat. The chancre was healing nicely. Later, this went on quite well, leaving but little loss of substance, and the bubo subsided almost entirely. The pustules, however, were very troublesome. There were many of them, of various sizes and of different grades of ulceration, presenting the features of so-called syphilitic impetigo, ecthyma, and rupia. Iritis seeming to threaten, instillations of atropia were used with success.

Without going further into the history, we have, then, a case of syphilis whose initial lesion was a chancre upon the lip. The important question is, how was the chancre contracted? The answer to this question involves so many delicate considerations that it may not be wise to express here a positive opinion in regard to it; but to entertain one, these points should be borne in mind: a woman of unimpeached reputation subjects herself to the manipulations about the mouth inseparable from a dentist's operation; about two weeks later there appears on her lip a lesion, the development of which is that of a typical chancre, and which is followed by other unmistakable manifestations of syphilis.

Bearing these facts in mind, whatever may be one's opinion in regard to the source of the syphilitic contagion and its manner of communication, the history of this case may well serve as a warning to all dentists, as well as to the medical profession. It will have special weight if considered in connection with the cases of inoculation from the virus of mucous patches in the mouth, recently investigated by Dr. Maury and the writer, and reported in the *American Journal of the Medical Sciences* for January, 1878, in an article entitled "Tattooing as a Means of Communicating Syphilis."

A prominent member of the dental profession in this city recently assured me he was constantly on his guard against the danger of conveying disease from one of his patients to another, keeping a special lookout for suspicious lesions. He has, he says, detected syphilitic lesions, and might, without this precaution, have inoculated them upon others. Such a course deserves to be followed by all; and perhaps it might not be amiss—if not already done—for the dental colleges to teach their pupils the diagnosis of syphilitic lesions in and about the oral cavity, impressing upon them the danger of inoculation and the means of avoiding it.—*C. W. Dulles, M.D., in Medical and Surgical Reporter.*

HINTS AND QUERIES.

An anæsthetic clinic will be held at the Dental Depot, corner of Broadway and Ninth Street, New York, on April 2d, from two to five o'clock. All parties interested are invited to be present, and also to attend the meeting of the First District Dental Society, that evening, when anæsthetics in dental practice will be discussed. Persons having new appliances or instruments which they will bring, can have them exhibited and explained by the committee.

C. E. Latimer,
W. St. George Elliott, } *Committee.*
J. Morgan Howe.

Can a nerve retain its vitality after the formation of an abscess?—J. L. F.

I. P. W., who asks in the February Dental Cosmos what Dr. Farrar would do in a certain described case of irregularity, is advised to send a plaster cast of both jaws (articulated) to Dr. Farrar, 103 South Oxford Street, Brooklyn. The doctor will doubtless indicate the appropriate treatment, either by private letter or through the Dental Cosmos, if the case be peculiar enough to justify it—Ed. Dental Cosmos.

Reply to D, in the Dental Cosmos for February, 1878.—There is a coloring of truth in what "D" says in his answer to Frank H. Brimmer, but only a coloring, and a homœopathic one at that.

It is reasonable to presume that "D" don't use amalgam (if he *is* a dentist), but does use gold. Did he ever think of the disastrous effects that might follow the use of gold as a filling, based on this same principle of "similia similibus curantur"?

Gold is one of the remedies indicated in *insanity;* need I add that a patient with a mouth full of gold fillings is as liable to insanity as one with a mouth full of amalgam fillings would be to mercurial poisoning?

In like manner this principle of homœopathic reasoning might be pursued until the entire art of dentistry was demolished. Our vulcanite plates would be cast aside, because they *might* produce mercurial poisoning, and likewise the gold plates, for fear of producing symptoms of insanity. Our use of tinctures, acids, etc., would be substituted by sugar of milk, and so on, until dentistry was left without a leg upon which to stand. But dentists, as a class, do not believe in Homœopathy, for it would be a gross inconsistency to do so. Therefore, I am inclined to think that if "D" will consider the matter in its broad sense, he will come to the conclusion that Frank H. Brimmer does "know what he says."—A. N. Roussel.

Will some one please state the exact time at which the Cummings patent will expire, also whether it is possible for it to be renewed?—B.

Answer.—The Cummings patent was granted for the term of seventeen years from June 7th, 1864; consequently, it will expire June 7th, 1881. The law forbids the extension of patents granted since March 4th, 1861; consequently, the Cummings patent cannot be extended after its expiration, except by act of Congress.—W.

Reply to E., who asks the philosophy of talcing fillings of oxychloride of zinc. The writer believes that the only advantage consists in the fact that the talcing coats the surface of the filling so that it does not absorb moisture. Any device by which the filling can be protected from moisture for forty-eight hours, or until it has had plenty of time to set, will answer the same purpose as the talcing, and some device to accomplish this is absolutely necessary to insure any degree of permanence to an oxychloride filling.—X. L.

J. H. D. asks for a method by which he can estimate the probable durability of an oxychloride or other cement for filling teeth, without waiting for actual results in practice. Make a pellet of the cement and put it in a cup with water, which may be set on the back part of the range or stove, where it will have a uniform temperature of about that of the mouth. The pellet should not be put into water until it is at least twenty-four hours old, as when properly used in actual practice it should not be allowed to be touched by the fluids of the mouth until at least that length of time has elapsed. Many specimens of filling materials will, when subjected for a few days to this water bath, either soften down or flake and break up. Those which stand this test may be used with more confidence than those which will not; this at least may be safely said.—H. E.

Freak of a Bullet.—During the battle of Murfreesborough, Tennessee, one of the wounded was Lieutenant Vining, of Company K, 5th Regiment Georgia Vols. On coming to the rear, he stated that he had been hit in the left cheek by a Minié-ball, which was in the wound yet, as he could feel it very distinctly, and desired me to remove it. The cheek was considerably swollen, a bullet-hole through it, but none through the other cheek. In the upper maxilla (left side) the crowns of the first and second bicuspids were freshly broken off. The first molar was missing, and its place filled with coagulum. With a probe I examined the wound in the cheek, and I plainly felt the outlines of a tooth. After a great deal of trouble, owing to the want of proper instruments, I finally succeeded in removing it, and it proved to be the missing molar. I suppose the lieutenant having his mouth open the bullet entered it from the right side, making its exit through the left cheek, and performing a rather novel operation of "transplantation."—Bernard Hess, D.D.S.

Bacteria in Teeth.—It is proposed in this article to offer in brief a solution of some of the difficulties which have long perplexed the dental profession, and at the same time to give a rational answer as to the *why* of certain operations or applications in the treatment of teeth before filling. It is well known that a decayed tooth with an exposed pulp may be treated with most of the irritants or antiseptics used by the profession, such as creasote, oil of cloves, carbolic acid, and oxychloride of zinc, and the pulp still live through it all, and remain active and healthful, perhaps for years; and yet the same pulp without such treatment, after the cavity has been thoroughly cleansed, will die under the kindest filling that can be employed. A dead or devitalized tooth in like manner, after careful cleansing and proper filling, will often, in an incredibly short period of time, develop trouble at the extremity of the root or fang, and its eventual loss becomes certain. The question has also been asked, Why do we wash out the cleansed cavity with creasote, or carbolic acid, etc., or treat the same with oxychloride of zinc in order to avoid a certain and speedy trouble or loss of the tooth? Now, in answer to, or in explanation of these things, it is here laid down, as the *first* and constantly producing cause, that the whole trouble results from *the presence of bacteria*,—those microscopic fungoid growths which are to be found everywhere in a more or less fully-developed state, from the primary *spore* up to the fully-developed *cell;* and that successful treatment must depend upon their total and absolute destruction in every case.

It is only necessary here to refer to modern research in regard to these minute objects, whether they be regarded as belonging to the animal or vegetable kingdom. Many valuable contributions have been made of late to scientific knowledge in respect to their nature and life, but none, perhaps, more valuable to our present subject than an article on Fermentation, by Professor Tyndall (No. 56 *Popular Science Monthly*, vol. x., December, 1876), in which he clearly points out that, while fixing themselves on the surface of substances or otherwise, they depend on oxygen for life, and, if deprived of access to atmospheric air, will seek their supply of food by going down into the substance in which they are present and decomposing it, in order to find and consume the oxygen which may enter into its composition. The following illustration by M. Pasteur is to my purpose, —the idea, but not the words, being his. "Take a jar of jelly, such as is put up for table use, close it, and if at any future time the cover be removed and a scum (a fungoid growth called *Penicillium glaucum*) is found upon the surface, the jelly is pronounced good. The spore of the organisms were inclosed in the air space between the jelly and the cover of the jar. When this fungoid growth is present as described, there will *always* be found an opening sufficient to allow free air to enter the space. These organisms live and flourish upon the oxygen of the air, with their roots, so to speak, fixed on the surface of the jelly. Now allow these same organisms to be confined between the cover and the jelly, as in the case just mentioned, with this difference, that the jar shall be hermetically sealed ; these organisms or germs soon fall upon the surface of the jelly, and their development or growth begins. They soon exhaust the oxygen contained within the air space; they then at once begin to decompose the sugar of the jelly for oxygen, and work themselves through the whole mass, decomposing the sugar, the result being carbonic acid gas, alcohol, and acetic acid, and the jar bursts or forces off the cover." The jelly now is sour, or in other words fermented. These organisms having been excluded from the free oxygen of the atmosphere have been compelled to go down through the whole mass, decomposing whatever they can for life.

This gives us a clue to the whole mystery. Without entering into the question of the cause of decay in solid tooth-structure, or attempting to show to what extent, if any, these fungoid parasites may aid in the process, it is sufficient here to state our proposition that in a carious tooth where the pulp is still living and exposed, *bacteria*, as I have ascertained by microscopical examination, are the destructive agents which act upon it, and cause its eventual devitalization.

So long as the cavity remains open, and atmospheric air gains access to the exposed surface, the *bacteria* have a plentiful supply of oxygen, and their radical connection, so to speak, with the pulp has but a slight effect upon it, or their action in the way of destroying its tissue progresses but slowly, whilst none the less sure is the final event. On the other hand, however, just in proportion as the air is excluded by the cavity becoming accidentally or otherwise more or less filled up, and as such filling may be capable more or less of furnishing oxygen, by so much is the energy of these microscopic agents directed to immediate action on, and decomposition of, the tissue of the pulp itself. Hence it is rationally inferred that, when a tooth is filled upon an exposed pulp, however slight the exposure, although the work may be done in the most perfect and artistic manner, its destruction must very soon take place, unless every trace of *bacteria* has been first removed. In the case of a devitalized tooth where the pulp has been entirely consumed, these persistent parasites continue their action and lay hold of the tissues which surround the tooth, forming a fungoid growth at its extremity, and causing much pain and suffering, until the soft tissues are broken down and a fistular opening has been formed, after which their energy is no longer solely directed to the work of decomposition in order to obtain food,— the admission of atmospheric air furnishing a more or less sufficient and direct supply of the life-giving oxygen. As in the case of a living tooth, so here the course of treatment indicated is first of all to totally destroy the *bacteria* and their spores. Without this a simple cleansing with a perfect filling can only aggravate the disease and suffering, and necessitate the speedy removal of the tooth or filling.

Again, it is now known that the spores of *bacteria* circulate in the normal blood, and only await a favorable opportunity to effect a lodgment in some part of the system. When this takes place disease of some form is the inevitable result. So it may happen that a tooth which has been treated perfectly and satisfactorily in every respect may again become diseased at the root, when the tissues had formerly been disarranged by disease, and rendered incapable of performing their normal and necessary functions. A devitalized tooth is at least a predisposing element of irritation, but in normal health and under ordinarily favorable circumstances the tooth will perform its functions with comfort to the patient for many years; but let the system become depleted from disease, or the tooth get an accidental blow, sufficient to cause irritation, followed by congestion around the root, and allowing that the spore of the *bacteria* floats in the normal blood, it is reasonable to conclude that one or more of these germs might be carried into and caught by the congested tissue, it and the root becoming thereby good soil for their growth and development. Moreover, a tooth may be well plugged, and subsequently the pulp may become devitalized, leaving the semi-decomposed matter in the pulp-canal. This would be an additional predisposing cause of irritation, and a better soil in which floating spore might find lodgment and flourish. Imperfect filling or subsequent decay in the substance of the tooth may also open up a channel through which *bacteria* may be again introduced, and trouble result as in the first instance. It is also within the bounds of probability to suppose a case where they have gained access by working their way down along the outside of the tooth, naturally and necessarily creating more disturbance and pain as they penetrate deeper and farther from access to air. In regard to fistular openings of every description and to every form in which *bacteria* assault the system, it may be said that nature makes constant effort to expel these parasites and heal the breach, but cannot always succeed without the aid of scientific and professional skill. The extraction of a devitalized tooth may so far help nature as to enable her to cast out the *bacteria* and heal up the fistular opening. But cases occur when the latter has become so extensive, and involves so much of the surrounding tissue, as to demand the application of some anti-bacterial remedy.

In whatever way we look at the various forms in which diseased teeth are affected, and the secondary or accompanying elements which are directly connected therewith, and fall within the province of the dental profession, satisfactory and effectual treatment can only be expected by commencing with the total eradication of these cellular pests, and reducing to the minimum all other predisposing causes of irritation. Whatever method be adopted with the view to accomplish this end, it must be *particularly* borne in mind that a treatment sufficiently vigorous to destroy the fully-developed *cells* will not necessarily, and perhaps never will, effect the destruction of the spores or germs of the *bacteria*. Total eradication can only be practically effected by a course of treatment, or series of applications, continued through a sufficient period of time to allow all the spores that may be present to become developed so far as to make their destruction possible by the agent employed. This is simply a scientific fact, into the discussion of which it is not necessary to enter. Creasote, carbolic acid, and oil of cloves will destroy *bacteria*; neither can they live in the presence of chlorine; hence oxychloride of zinc is properly employed in capping exposed pulps and in filling pulp-cavities; but, when employed in capping exposed pulps, it is such an exceedingly powerful irritant that many patients cannot endure the pain it causes in the course of its action. Of all the agents known to the profession, no *one* is so perfectly satisfactory in its action as carbolic acid, of full strength. It not only destroys the parasites, but acts as an anæsthetic to the nerve, and makes the treatment simple, easy, and effectual, with the minimum of suffering to the patient. In the case of a living pulp, a series of two or three applications, at intervals of twenty-four hours each, will perhaps suffice to eradicate every trace of *bacteria*. It is then possible to *cap* the pulp with oxychloride of zinc, and complete the desired filling with perfect ease, comfort, and entire success. The oxychloride of zinc, so long as it retains its chlorine, will remain as a constantly-present preventive against future development of spore, and the pulp will continue to live and act in most cases equally well with a tooth filled, containing a simple cavity. If, however, the exposed pulp is found to be so much congested or devitalized that it is not able to recuperate under the treatment of carbolic acid, carefully remove from time to time such portions of the pulp until healthy tissue is reached. Even if one-fourth of the pulp only is found healthy, then fill the remaining pulp-cavity with oxychloride of zinc, and upon this the cavity of decay may be filled with gold, or any other material the operator may select. During the treatment of an exposed pulp, or a devitalized tooth, a bit of cotton saturated with carbolic acid should be placed in the cavity and sealed with wax, or Hill's stopping, or whatever may be at hand.

At this point, however, kindly allow me to make a suggestion. If the pulp is in the slightest point exposed, the opening may be so minute that these microscopic cells might possibly work their way to the pulp, and yet the applied antiseptic not pass in sufficient quantity to destroy their life; therefore, it may be better to open fully to the pulp before treatment. I am following this plan for the present.

If a devitalized tooth is under treatment, after the pulp-canal has been thoroughly cleaned and carbolic acid has been pumped in at intervals, as before stated, so as to reach and destroy any fungoid growth at or around the apex of the root, or in the surrounding tissue, the tooth can be filled, and little or no fear of trouble anticipated. For permanently filling the pulp-cavity, carry a small pellet of cotton saturated with carbolic acid to the extremity of the fang, pack solid, and complete with oxychloride of zinc. The location of the disease may be reached in the way just mentioned, or it may be treated through the fistular opening (if there be one), or by a passage opened outside of the root down to the seat of the trouble. At any rate, whatever plan the exigencies of the case may suggest or require, the object must be to secure the application of the antiseptic to the root of the trouble, and success will be certain. This I put down as the result of my own experience and practice now so conducted for some time past. If any case should occur where, through some oversight or imperfection, disease returns, it is simply necessary to remove the filling and re-treat the whole case. Every form of disease that has come under my notice, where *bacteria* as the cause were indicated, whether of the tooth, or mouth, and even bad fistular openings of several years' standing, has yielded to the carbolic treatment, and obeyed the law in every instance. I might give in detail many cases which would illustrate my proposition beyond a doubt, but will not trouble the reader with them.

It is hardly necessary to bathe a prepared cavity with an antiseptic before filling, when the operator is *sure* that the pulp is not in the *least* exposed, for the purpose of destroying *bacteria* or their germs, as scientific research shows that these organisms very soon die when deprived of oxygen.

In conclusion, the above suggestions have been made after careful and practical consideration, and are commended to the profession as well worth their serious thought and attention.—G. O. Rogers, D.D.S., *Hong-Kong*, 15th August, 1877.

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ORIGINAL COMMUNICATIONS.

DENTAL PATHOLOGY AND THERAPEUTICS.

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[Entered according to Act of Congress, in the year 1873, by J. Foster Flagg, D.D.S., in the office of the Librarian of Congress at Washington.]

(Continued from page 134.)

PERIODONTITIS.

THE word *periodontitis* is derived from *περι*, *about*, *οδους*, *a tooth*, and *ιτης*, *bold*, *rash;* a suffix denoting inflammation. Its signification, therefore, is *inflammation about a tooth.*

As has been shown when upon tooth-formation, a membrane covers the *cementum* (pericementum) and lines the alveolus by covering its bony walls.

This membrane, simple or single in its microscopic anatomy, duplex in its functional relations, as it is formative and nutrient to both *cementum* and bone, is the *seat of origin* to that condition which, even after it has become largely extended, and has involved membranous, cellular, osseous, and surrounding tissues, is nevertheless known to dental pathologists only as "*periodontitis.*"

It is very important that a clear idea of the *inception* of this painful disease should be inculcated, for with this every phase of the difficulty is quite clearly apprehended, and many concomitants, seemingly complicated, are rendered easy of explanation.

It is also through this *basal* view of the subject that the possibility of teachings in relation to the treatment of periodontitis is much facilitated, for with it the *rationale* of our mechanical, medicinal, and hygienic therapeutics, in this connection, is almost *intuitively* apparent.

Recognizing that with every vicissitude of tooth-life the probability of its prolonged existence becomes more doubtful, and the possibilities of its restoration to comfort and usefulness more difficult of apprehension, I shall endeavor to treat the subject of *periodontitis* with a systematic minuteness which will, I hope, enable the practitioner to refer to salient points, or carefully read upon any especial subdivision, as may at any time be required, while maintaining for the younger student that *consecutive completeness* which is so desirable in the consideration of any disease.

Before entering into the discussion of decided *periodontitis* I wish to direct attention to a condition of general dental hyperæsthesia which frequently presents for relief, and which is neither dependent upon any perceptible local cause, nor is likely to result in anything more than *decided discomfort,—inability to properly masticate food* and *marked sense of uneasiness.*

Upon inquiry it will usually be found that this tenderness is due to one of three causes, viz.:

I. Functional disturbance, either gastric, hepatic, or general nervous.

II. Systemic debility (predisposing cause); changes of temperature, as in spring or autumn; mental or physical "worry;" malarial impression (so called); or other well-recognized depressing influences (exciting causes).

III. Systemic hyper-acidity (sour acid), either from the use of sour acid medicaments, or sour acid foods, as strawberries, tomatoes, peaches, sour apples, pickles, and the like.

With all these conditions the teeth notably sympathize; that they do so *more* than the ears or eyes is not advanced, but these are not subjected (except occasionally) to that excess of irritation which comes from the thrice daily attempt at *forcible occlusion* of the teeth.

It is this effort which, perhaps for the first time, notifies the patient that hitherto unrecognized *force* is used in *ordinary mastication*, and that the comfortable indulgence of this is entirely precluded.

The *first* and *second* causes of this trouble are clearly not within the confines of dental treatment, and it is therefore sufficient that the diagnosis is made, and the patient referred to the general practitioner for treatment; but the *third* cause so frequently evokes the natural question of "What shall I do?" together with the assertion, "I must eat!" that it seems proper to devote a few lines to the practical consideration of systemic hyper-acidity.

There is probably no pathological induction which seems more decidedly idiosyncratic than that of hyper-acidity from articles ordinarily viewed as *food.*

I do not refer here to such as produce gastric irritation (dyspepsia), for it is well known that *no known consideration* governs this; *fat* producing it in one, *celery* in another, *house-bread* in a third, and so on indefinitely; and equally is it recognized that *quantity* seems to have no more relative influence than does *material*, the tiniest morsel frequently producing just as much disturbance as the most inordinate indulgence; but it is to *acids*, such as I have noted, that *this* condition of "systemic hyper-acidity" is unquestionably due.

It is, however, as I have said, an effect which is *idiosyncratic* in the extreme, a single tomato, a single apple, or a peach, even a single acid strawberry, will, with some, induce that suspicion of tenderness which is the well-known forerunner of what would follow as the sequence of any further indulgence.

On the other hand, it is much more usual that this dental tenderness only supervenes as the result of excessive and long-continued indulgence in this peculiar diet.

For this reason this subject is worthy the attention of the dentist, for while the marked impressibility of the extreme cases of trouble would naturally *contraindicate any indulgence*, less sensitive organizations are, by proper treatment, so controlled as to permit of a reasonable use of these coveted fruits and condiments, and of the benefits (medicinally) of the valuable acid tonics; while, again, those who are annoyed only by excessive and long-continued indulgence in what is usually regarded as perfectly proper and highly-esteemed *food*, are enabled to partake of such without incurring the penalty of this disagreeable annoyance.

The natural corrective for acidity is an alkali, but in the *use* of this is the danger of its *abuse;* for it must be remembered that the condition of acidity in the stomach is a natural one, and therefore not to be interfered with, and that the delicate point of simply reducing *hyper*-acidity is alone desired.

As the result of extended experiment, I have found nothing better for this purpose than *bicarbonate of soda* in very small doses,—from one-fourth of a grain to one grain, once, twice, or thrice daily. A convenient mode of administering this medicine is to weigh ℈j of bicarbonate of soda, and dissolve it in twenty dessertspoonfuls of water; thus taking half-teaspoonful, teaspoonful, or dessertspoonful of the solution as $\frac{1}{4}$ grain, $\frac{1}{2}$ grain, or 1 grain doses of the alkali are indicated.

By this treatment I have relieved much of this kind of annoyance to patients, and enabled many to indulge with impunity in food enjoyment which without it had proven an impossibility.

In greater degree, the irritation of the pericemental membrane develops *periodontitis*, which, in accordance with amount of irritation, systemic condition, and temperamental attributes, is of every grade of rapidity of induction, degree of severity, length of duration, and extent of complication.

The mildest cases are found in such as present, with merely marked soreness of the tooth, quite prompt appearance of symptoms, decided restriction as to amount of tissue affected, and prompt "resolution of inflammation," and permanent cure upon removal of cause or application of derivant or counter-irritant medication.

The next grade of periodontitis is found to possess more marked soreness of the tooth, not such prompt appearance of symptoms, more extended tissue-irritation, and very deliberate "resolution" as the result of accurate and somewhat persistent medication.

A third grade develops, with sufficient celerity, excessive tenderness upon pressure, not only upon the tooth but of all surrounding parts, pronounced throbbing, great pain, and general febrile excitement. It is requisite that the utmost gentleness, accuracy, promptness, thoroughness, and persistence should mark its treatment, and only with this is the pain relieved and the tooth saved.

A fourth grade necessitates an almost immediate abandonment of all resolving antiphlogistic medication, and an equally prompt resort to that stimulation which shall most quickly and most comfortably result in *suppuration;* while yet

A fifth grade even precludes this possibility while defying all other treatment, and the various phases of violent, acute inflammation rapidly succeed each other with increasing intensity, compelling an early surrender by the *extraction of the tooth.*

Periodontitis has for its causes,—

1. Want of occlusion.
2. Mal-occlusion.
3. Salivary calculus, tartar.
4. Looseness of tooth or root.
5. Induration of tooth-tissue.
6. Cavities of decay impinging upon cementum.
7. Mechanical irritation (injuries, etc.).
8. Dental manipulation.
9. Excess of filling material.
10. Inflammation of the pulp.
11. Excision of pulp without *alleviating* hemorrhage, if required.
12. External irritation by forcible withdrawal of pulp.
13. Putrescing pulp.
14. Previous periodontitis.
15. Action of medicine (locally).
16. Action of medicine (systemically).
17. Action of virus.

I. *Want of occlusion.*—It is from the unique fact that *periodontitis,* from this cause, is due to the absence of something rather than the presence of anything, that I have given it place as the *first* of my list of irritants.

It will be noticed, almost always, when a patient has lost a sufficient number of antagonizing teeth to result in complete *want of occlusion* on the part of a former antagonist that a gradual elongation of that tooth will take place.

This may continue until the tooth is entirely exfoliated, and this without pain, or at least until pain is caused by irritation due to looseness; but in other instances it is not long before the irritation concomitant with the act of exfoliation becomes such as to cause increasing uneasiness, until it eventuates in constant pain and decided inflammation.

If there is a scarcity of teeth, and it is desirable to incur the expense of a partial artificial denture (could such be inserted), it will usually be found a corrective, and the troublesome tooth may thus be made a useful organ for many years.

II. *Mal-occlusion.*—This is a more sure and a more fruitful source of trouble, by far, than the first cause, and though sometimes easily combated by grinding antagonizing cusps and faces in such wise as to secure firm occlusion, it is nevertheless frequently a matter of considerable difficulty, requiring much thought, labor, and expense to overcome it.

This condition may arise from various causes, such as injuries (blows, fractures of the jaw, etc.), or habits of mal-occlusion (to avoid other tender places or to accomplish satisfactory articulation for mastication), but, as a rule, it is due to one of two causes: first, irregularity of the teeth; second, change of position of remaining teeth consequent upon loss of teeth.

1. *Irregularity of the teeth.*—The remedy for this naturally presents itself in either the correction of the irregularity or the extraction of a tooth or teeth; or, possibly, the *former* by means of the *latter.*

It is not possible, in this connection, to treat of this matter in any other than the *most general* terms, for at once is opened the entire subject of Orthodontia; but while I say, in one word, that the cure for this consists in securing a *permanently good occlusion,* I cannot refrain from giving it as my experience that a great deal of unnecessary machinery is frequently employed in obtaining these results. Plates, planes, bars, screws, levers, etc., are thus used in many a case in which two or three rings, cut from *good* rubber tubing, and a piece of *strong* thread (bookbinder's), would have made all needed apparatus,—apparatus, indeed, which would not only have worked more gently, while yet even more promptly, but which would have been adapted more easily and worn more comfortably.

But, again, it is moreover true that the judicious extraction of one or more teeth will sometimes permit the exercise of that *tendency* which promotes the moving *apart* and *backwards* of the incisors and cuspids and the *closing together* and moving *forwards* of second bicuspids and molars in such wise as that in the course of *a year or two*, and sometimes even in a few months, all irregularity will receive a natural correction, and the very best of occlusions will result from the gradual modeling of the moving teeth into arch by the action of the tongue and lips.

2. *Change of position of remaining teeth consequent upon loss of teeth.*—This is a subject which, I think, demands the serious consideration of the present and the "coming" dentist.

It is well known to those with whom I have the pleasure of being most intimate, professionally, that I have for many years been occupied with the problem of the *excessive* saving of teeth, that, in the prosecution of this work, I have stepped entirely outside the bounds of routine dentistry, and that my *practical results* are such as to warrant each year an increasing deviation.

This work is the direct outgrowth of early impressions upon *this very point.*

Thousands of teeth are extracted with the remark, *and with the belief* upon the part of both patient and *dentist*, that each extraction is "only the loss of a tooth;" but this is, most emphatically, *not so.*

It is the rare, the very rare exception, that it is "only the loss of a tooth."

On the contrary, the extraction of the *first tooth* from a normally-planted, handsomely-occluded, permanent set of teeth is much more likely to be *that act* which promptly eventuates in the loss of *perfect* mastication, soon results in further loss of teeth with its attendant *very imperfect* mastication, and, finally, ends in a resort to a partial or entire artificial denture.

It is probable that the *only exception* to this rule is found in the *early extraction* of *very badly decayed* (pulp complications) sixth-year molars; and it is in these cases alone that I regard with any equanimity the extraction of teeth.

Not that I, by any means, advocate the removal of first permanent molars (moderately decayed) upon the broad ground of future benefit; but I recognize that in this (if in any extraction) there is the best possible chance for future reparation of all injury to comfortable, complete mastication, while it, at the same time, offers also the best chance for avoiding the inevitable and *irreparable* injury which would accrue from extraction of these teeth in early middle life.

The truth of these positions is far sooner and more sadly realized by patients than by dentists, as they note the separating of remaining teeth, with its attendant wedging of food into the interstices, pressure upon the gum, and final abandonment of an entire side for mastication. The soreness of teeth resultant from constant use on the one side, and the deterioration of teeth by looseness and decay from want of use on the other side, are conditions which present themselves daily in my practice, and which additionally incite to that service for unbroken arches which cannot be heartily rendered, except as the result of a constant mental recognition that the inception of all this trouble was the, *probably needless*, extraction of a permanent tooth.

(To be continued.)

THE CASE OF THE WISDOM-TOOTH IN RELATION TO THE HYPOTHESIS OF THE ULTIMATE SUPPRESSION OF THE TEETH IN MAN.

BY A. H. THOMPSON, D.D.S., TOPEKA, KANSAS.

(Continued from page 145.)

PART II.—DEDUCTIVE.

IN making deductions from the foregoing array of observations and epitome of our present knowledge of the phenomena and characteristics presented by the wisdom-tooth, we find much that needs translation and explanation before the true meanings can be read aright.

We find two central and principal facts around which much of lesser importance clusters, and that radiates and contributes to these facts with mutual support. The first is the fact of the *gradual suppression* and disappearance, through the innate defectiveness of structural organization, of the wisdom-tooth; and the second is the fact of the powerful coercive force exercised by the anticipatory and premature *contraction* of the *jaw*, thereby causing great compression of the tooth during its origin, development, eruption, and use. That the tooth is thus defective and that the jaws have contracted is proven by the facts and observations we have cited.

The fact of the contemporary and progressive disappearance of this tooth is concurred in by many writers, and the leaders of thought in the profession are rapidly coming to the same conclusion. Mr. C. S. Tomes says,* "There is some little evidence that the wisdom-tooth is in process of disappearance from the jaws of civilized races. . . . It seems to be a legitimate inference that a further modification of the race in this direction will result in the disappearance of the wisdom-tooth altogether." But he adds, by way of caution, "Nevertheless, for the present, a case in which the wisdom-teeth are very small can hardly be called a typical, well-developed European mouth." Mr. Felix Weiss says,* "One fact appears to be pretty well established, that the wisdom-tooth is gradually disappearing." He also quotes Mr. John Tomes as writing,† "The great variability in the size and shape of the wisdom-tooth in civilized races, its occasional absence, and the irregularity of the period at which it is erupted, may, when contrasted with its larger size and regular form in the lowest savage races, be taken as an indication that it is slowly disappearing, and that there is a strong probability that in future generations it will be normally absent." Others are also convinced "that the opinion is certainly gaining ground that the wisdom-tooth is disappearing." Mr. Charles Darwin observes,‡ "It appears as if the posterior molar or wisdom-tooth were tending to become rudimentary in the more civilized races of man. . . . I am assured by dentists that these teeth are much more liable to decay and are earlier lost than the other teeth. It is also remarkable that they are much more liable to vary both in structure and in the period of their development than the other teeth."

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* Den. Anat., p. 382.

The fact of the disappearance of this molar has indeed become almost the certainty of demonstration, and may be considered as something established, at least, in the hypothesis of the suppression of the teeth in man.

In comparative observation, beginning with the higher apes, in whom the third molars are, of course, yet quite perfect, we begin to find the first faint indication in some species of the first step towards the degradation of this tooth, the tendency towards suppression being, in fact, begun thus early. But the tooth is of course in all respects yet as perfect in structure and as serviceable to its owner as the other molars, barely losing, when altered at all, but a perceptible amount of perfectness of outline. Of this, Prof. Owen says,§ "In the orang the first and second true molars are rather larger than the third; they have each four cusps, but less developed and with shallower interspaces than in the baboons and monkeys. . . . The last molar has two external cusps, and the posterior inner one is almost obsolete. . . . The dentition of the chimpanzee in all of its most prominent characteristics is strictly quadrumanous, yet in the minor particulars, in which it differs from that of the orang, it advances towards the human type. . . . The three true molars are almost equal, the first being smaller or not larger than the last, which is the only molar equaling in size the corresponding teeth in the black varieties of the human subject, in which the true molars attain their largest dimensions. . . . The crown of the third molar in the chimpanzee is larger antero-posteriorly, from the greater development of the fifth posterior cusp, which, however, is rudimentary in comparison with that in the Semnopitheques and Macaques." Mr. Charles Darwin says (op. cit.), "These teeth are rather smaller than the other molars, as likewise is the case in the chimpanzee and orang, and they have only two separate fangs." Mr. C. S. Tomes, however, observes, concerning the perfection of this tooth in the apes,* "In Macaques the third molar is larger than the first two, and is quinquicuspid below; the upper quadricuspid. . . . The wisdom-teeth present the same pattern of grinding surface, and are as large as the other molars, and there is abundant space for them. The molar teeth of the apes are also squarer, their cusps sharper and longer, and the characteristic patterns more strongly pronounced than in man. . . . It is generally said that in man the molars decrease in size from before backwards; that the first molar is largest, while in the anthropoid apes the contrary is the case. This is on the whole true, but requires some qualification, as in the Australian blacks the second and third molars are not smaller than the first, and of the chimpanzee the same thing may be said. . . . In the anthropoid apes the wisdom-tooth is nearly or quite as large as the other molars, and shows no variability, while it comes into place almost simultaneously with the canine. . . . In the higher apes, such as the gorilla, the third molar is in every respect a well-developed tooth, sometimes even larger than the first or second molar, but instead of a spongy, softened crown, it has a crown on which the cusps are arranged according to the typical pattern."† In the cast of a gorilla's skull in the collection of the writer, the upper wisdom-teeth are perceptibly contracted transversely in the posterior half of the tooth.

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* Brit. Jour. Den. Sci., vol. xix. p. 260.

† Den. Miscellany, vol. iii. p. 247.

‡ Descent of Man, vol. i. pp. 25–256.

§ Odontography, pp. 444–5.

Passing to the lower races of mankind, we find marked indications of progressive, if irregular, imperfection and degeneracy of the third molar, and intimations of its possible future disappearance, which is now in progress in civilized races. In many, or perhaps most, of the lower human races it is still a good and useful organ, and possesses but an occasional variability towards imperfection, and yet it is inferior to the same tooth in the anthropoid apes and the quadrumana. Mr. C. S. Tomes says,‡ "The wisdom-tooth (in lower races) has ample space to range with the other teeth, and is a characteristic molar. The pattern of its grinding surface (quadricuspid if upper, and quinquicuspid if lower) and the disposition of its roots correspond with the first and second molars, which do not greatly exceed it in size. Specimens of negro skulls may be found in which there is scarcely room for the wisdom-tooth, and in which, consequently, it is a little stunted in its development; on the other hand," it is often good "in European mouths, though, as a rule, it is much smaller than the other molars, does not bear the characteristic pattern of cusps and grooves, has its roots connate, and is not infrequently a mere rudimentary peg. . . . In the lowest races of mankind the wisdom-tooth appears to vary but little, is of large size, and is never misplaced. . . . In the skull of a Caffre, the oblique ridge on the upper molars is distinct, etc., and the wisdom-tooth, in this skull, has the normal number of roots well marked.* . . In the lower races . . . this is a large functional tooth, etc. In more civilized races it is quite exceptional for the lower wisdom-tooth to have the four cusps distinctly developed. This is one of the things which pointed to its disappearance." Mr. Mummery said,† "Among the stronger African tribes the third molar was always present in the lower jaw, but in the more enfeebled races it was frequently absent." Prof. Owen makes the following observation:‡ "In man, the wisdom-tooth has the two inner tubercles blended together, and a fissure extends, in many instances, especially in the Melanian varieties, from the middle of the grinding surface, at right angles to that dividing the two outer cusps of the posterior border of the tooth. . . . The two outer fangs of the wisdom-tooth are more commonly connate, or confluent, . . . in the Caucasian race. I have never seen these varieties in the Melanian races, and in the Australian the upper wisdom-tooth has always presented the same three-fanged implantation as in the chimpanzee and orang. . . . The wisdom-tooth is smallest of the three molars in both, but the difference is less in the Melanian than in the Caucasian races." Mr. C. S. Tomes says§ that this "expresses a general truth," but that the "double and triple implantation is not constant in the Melanian races,"—showing deviation from perfection. Prof. H. Allen|| describes the third and fourth molars of an Australian skull, which both show "tendency to the bicuspidate type."

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* Op. cit., pp. 375, 379, 381, 382.

† Proc. Odon. Soc. in Brit. Jour. Den. Sci., vol. xix. pp. 259.

‡ Op. cit., pp. 380–81.

Passing now to civilized man, we find the change in the condition of the wisdom-teeth to be very great indeed; the difference being more vast between civilized man and savage races, in this regard, than between the latter and the highest apes. In most respects however, as Mr. C. S. Tomes remarks,¶ "the differences which serve

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* Proc. Odon. Soc. in Brit. Jour. Den. Sci., vol. xix. p. 259.

† Ibid., p. 259. ‡ Op. cit., p. 454. § Op. cit., p. 20.

|| Dental Cosmos, vol. xvi. p. 619. ¶ Op. cit., p. 382.

to distinguish the teeth of the lowest savage from those of an European are very much the same with those that mark the step from a quadrumanal to a human dentition,"—the latter divergence, he thinks, being greatest in respect to ordinary differences; though the greatest difference, that in regard to the wisdom-tooth, certainly lies between the higher and lower races of man. In civilized man, the degraded condition of this tooth in its degeneracy and imperfection is very great, as compared with the very nearly perfect condition of the same organ in the lower primates.

In dealing with the second great central fact brought before us by the observations on the wisdom-tooth in man which we have noted, —*i.e.*, the remarkable retraction of the jaw in every direction, but particularly from the posterior part,—we observe also the differences presented by the lower forms. Mr. C. S. Tomes tells us, as already quoted, that "in the lower races of mankind the wisdom-tooth has ample space to range with the other teeth," and that in the apes "there is abundant space for them, so that they play an important part in mastication. . . . *One is struck by the great backward elongation of the jaws, etc., in the apes. . . . The teeth and jaws are much larger in all their directions" than in man. But the want of space in man is only too conspicuous; the contraction acts as if expecting the absence of the wisdom-teeth, and this having failed to occur, is, in consequence, a premature and anticipatory operation of the laws of economy of growth. The compression the shrinking of the contracted bone exercises upon the wisdom-tooth in all stages of its existence must be very great, and possesses as potent influence in hastening its suppression as its own innate, growing defectiveness. As Dr. D. C. Hawxhurst has well said,† "The maxillæ of civilized races are smaller than those of savage races, . . . which has come about through slow changes that have taken place in the environments, . . . through the influence of which there has been a hereditary transmission of a small element of decrease to each successive descendant. The teeth have felt the influence of this changed environment fully as much as the jaws, but not in the same way. They have dwindled less than the maxillæ, and are therefore too large for the jaws, and suffer from unnatural pressure." This fact cannot be too much dwelt upon, and the collateral consideration that the contraction of the jaws is premature and anticipatory of the corresponding contraction of the teeth,—which latter has, as yet, failed to obtain. He continues: "The wisdom-tooth has suffered from this disparity between the size of the teeth and the jaws more than the other teeth. . . . It is slowly becoming rudimentary. The inability of the hard parts of the teeth to respond in size to their lessened function, or, in other words, to keep pace in retrograde evolution with the jaws and soft parts, has resulted in weakening the structure of these organs." This unnatural pressure has undoubtedly had much to do in inducing the stunted condition of the wisdom-tooth. Mr. C. West has said,* that "he has invariably found that where the dental arch was well formed, the wisdom-tooth was well developed; but where there was contraction and general deterioration of the physical structure of the mouth, the wisdom-tooth assumed an abnormal appearance." This rule is scarcely borne out by observation, for in many cases of broad, roomy arches the wisdom-tooth has failed to appear, while in some contracted, V-shaped arches it has appeared in comparatively good shape; but there is, of course, a general truth in his rule. And that increasing contraction of the jaw in the higher races is contributing largely towards the suppression of the wisdom-tooth, there is no doubt.

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* Op. cit., pp. 377–79.

† Dental Cosmos, vol. xix. p. 125.

(To be continued.)

TRANSLATION.

THE DENTAL PULP AND ITS DISEASES, FROM THE GERMAN STAND-POINT.

TRANSLATED FROM DR. R. BAUME'S "LEHRBUCH DER ZAHNHEILKUNDE."

Results of Gangrene.—As an associate of the suppuration of the tooth-pulp, there follows a transformation of the nutritional cells into pus-cells. Gangrene shows itself to us under other expressions.

We have already considered the hyperæmia which is the great characteristic of inflammation of the pulp. We have been led to perceive in it the expression of over-fullness in the circulation, a congestion which is not stagnation so long as the veins continue to return the blood into the general circulation.

The appearances which expose themselves in the progress of a pulpitis are to be easily and fully appreciated as witnessed in the varying stages of venous congestion. The cases are rare indeed which may not be followed step by step, the conditions holding themselves exposed to an easy observation.

We see, corresponding to the time of interferences with the return circulation, great mingling of blood in the pulp-circulation; every shade of color from a bright red to a dark blue being represented. The dark blue is expressive of the highest hyperæmic point. At this time the vessels are so engorged that a common consequence is their spontaneous rupture, whereby, as a consequence of the breaking up of the cell-walls of the red corpuscles, the coloring matter is absorbed by the dentinal canals, thus giving to the tooth a red appearance. At this time the pulp is found almost deficient in vital resistance, so altered has it become in character.

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* Proc. Odont. Soc. in Brit. Jour. Den. Sci., vol. xix. p. 260.

A gangrene follows the high point of a hyperæmia as a consequence of the over-distention of the vessels and of the blood effusion; the tissues melting down as it were in presence of the change, the structure elements giving way little by little until all are destroyed. First in the study we are able to remark with the naked eye the separability of connective tissue—bindegewebe—blood-vessels and nerves; later the pulp is seen as a common mass, dark gray or black in color, or if the connective tissue remains at all distinguishable, it is only at limited spots. If now the microscope be employed, the place of the tissue is found occupied by fatty material; drops of fat are to be seen abundantly in all directions, the remnant of the vessels and nerves being covered—besetzt—with them.

Finally, a pulp so overwhelmed breaks down into a dark-colored, greasy, putrid mass. No longer are we able to distinguish anything of its organic character; the destruction is complete; it is in that state which is commonly referred to as moist gangrene—gangrène humide—of the pulp. The form of pulp-gangrene known as sphacelus—gangrène sèche—is the most common.

Dry gangrene—mummificatio pulpæ—is met with as the consequence of evaporation of the circulatory juices from the part. The pulp in these cases is left either as a crumbling or as a smeary mass, both of which are alike offensive. In many cases the ill smell is alone the thing complained of, as in the instances where mummification follows chronic inflammation.

Does sphacelus of the pulp occur, as, for example, in those instances where the organ is fully laid bare, then the affection involves its whole body; seldom indeed is it that the destruction is found confined to a part. Examining such pulps with great care, one is enabled to make himself acquainted with the nature of the demarkation line which is to be seen beneath the sphacelus; it has its existence in granulation cells which the falling away of the mortified part exhibits. So low, however, is the reparative force residing in such granulations, that the protection afforded is not sufficient to prevent the destruction of the organ at large.

When the unexposed pulp is met with in a putrid state, the dental canal will be found filled with the juice—jauche. The coloring matter of the blood having been already absorbed by the canals, the dentine has become of a dark color, as is plainly to be seen through the enamel. The whole tooth-crown presents a brown, discolored appearance. The microscopic observation of such tooth-bone teaches that the lack of translucency arises out of opaque canal-contents, and one is left in no doubt that the opaque obstruction is the pulp-juice. Sometimes it is the case that all the teeth are found thus discolored. I have in my possession a section of elephant tooth which is extraordinarily rich in this expression,—welcher noch ganz ausserordentlich übel riecht,—even though it has laid away many years. It is not to be doubted that in such cases the juice has been stored in the bone, this being possessed of the common fetid smell.

Teeth with gangrenous pulps are to be recognized easily, both by the changes in color and smell. The affected pulp is commonly unsensitive. If the organ is completely destroyed, the tooth feels to the patient as if foreign and dead. A first sensation of pain is felt when the irritation has extended itself to the periodonteum, this membrane sooner or later becoming inflamed and sensitive, the condition having associated with it more or less swelling of the face.

At this place it may not be amiss to refer to a condition that has not yet been described. It is that state which finds its recognition in a preliminary swelling of the face, the association of the swelling being with an involved—zusammenhangen—periodonteum. The swelling progresses with a high grade of œdema, which quickly deforms the face. This is the form of œdema which seems so naturally to run into erysipelas, and which by many is distinguished as tooth-rose. The swelling, while very rapid, has associated with it very little pain, either as the tooth or associate parts are concerned; it reaches not unfrequently its highest stand-point in a very few hours, and even as rapidly is it wont to vanish after two or three days of continuance. The whole affection runs its course in a very short time, and commonly without any suppurative result. Prominent as a sign is the absence of the ordinary inflammatory phenomena. Sometimes, however, there succeeds or remains a state in which exists inflammation attended both with swelling and suppuration.

These œdematous swellings are apt to follow each other at short intervals, and to repeat themselves in many cases very often without leaving behind them any signs of inflammation. Where the destruction of the pulp is complete and the juice is desiccated the swellings are found to disappear, while the tooth or its roots stay many years in the jaw without provoking further trouble.

As the cause of the œdema, one recognizes without difficulty the lesion as residing in the pulp. Undoubtedly, particles of the decomposing cellular tissue find their way into the circulation, thus exciting the disturbance.

The patient in these cases has very little occasion to complain of the pain. The tooth is seldom sensitive to percussion; the tension in the swollen parts is very easy of endurance; in short, the single evil—übelstand—is the fearful disfigurements of the face which not unfrequently ensue. The absence of sensibility—unempfindlichkeit—about the tooth is our warrant for inferring that periodontitis is not the cause of the trouble.

4. Hypertrophy of the Pulp—Polyps.—Inflammation of the pulp has as one of its sequences intumescence. The organ stands prominently exposed through the break in the tooth-bone; the continued irritation to which it is subjected resulting in a persistent enlargement of its parts.

This hypertrophy may be discussed under the head of swelling. I believe it is to the advantageous understanding of the subject that it be considered as a phenomenon associated with inflammation. Pulp-hypertrophy certainly exhibits itself as a new formation, yet is the new growth allied in its histological characteristics with certain of the products of inflammation, as is plainly enough made evident in an examination of the granulation-cells.

The hypertrophy arises, therefore, out of inflammations of the pulp, and progresses variously as regards the size attained. When the opening into the cavity favors observation, it is seen as a pedunculated body, and becomes known as a polypus.

The polypi of the pulp are red swellings, which, in color, resemble the gum. Externally they are of smooth face and polish. By superficial observation it is easy to confound a pulp-polypus with the polypus of the gum. The new formation begins as a little prominence, which quickly enlarges itself so as to project through the carious opening and cover the cavity of decay. Seldom is the growth of any considerable size; the ordinary bulk being that of a pea or of a half bean or a whole bean. In infrequent instances, the growth is of an extent which falls over the walls of the cavity and associates itself with the gum-tissue. In these cases it is not always found an easy matter to distinguish the one from the other, particularly as it is the case that because of defects in the walls of teeth the true gum-polyps are known to present as pulp-polyps.

Observation by the microscope exhibits these growths as new formations made out of the connective tissue, and which are richly endowed with a capillary circulation, the vascularity being a characteristic feature. The nerve element is, however, absent; consequently, sensibility is lacking,—unempfindlich. These growths can be picked to pieces without any attending pain. The manner of growth is very rapid; if extirpated to-day they will have appeared again by to-morrow.

5. Periodontitis.—Periodontitis is a frequent sequence to pulp-inflammation. It may have its meaning in a true extension of the

inflammation from the one body to the other, arising out of the continuity of structural relation. It is more commonly, however, associated with suppuration of the pulp, and is almost sure to be found where gangrene of that organ exists. This subject is considered in another part of our volume.

The Causes of Pulpitis.—This sickness of the pulp arises in almost all instances from irritation consequent on its exposure. This irritation commences with the least defect in the enamel. Inflammation, however, is to be expected only after decay has reached the central cavity.

It is understood that the mere laying open of the pulp-cavity is not the sufficient explanation of a destructive inflammation; this is well enough shown in those accidental instances of exposure where a properly-directed treatment is found able to obviate all ill results. It is by the repeated irritations to which an exposed pulp is subjected that the effects we have named are brought about. Therefore it is to be assumed that in our art lies the prophylactic means.

In our daily practice we meet only the cases where inflammation and pain are associated with an exposed pulp. The irritants out of which these conditions arise are the hot and cold articles of food brought into contact with the organ in the act of eating. Very seldom, indeed, is any other cause to be perceived. Only extraordinarily seldom is it that we meet with a sound tooth which is complained of as aching badly. The pain associated with such teeth is apt to be of a trifling nature. This form of trouble is to be seen in women most commonly, occurring during pregnancy or the season of menstruation. This form of inflammation is to be met with, also, in very young girls,—bei jungen mädchen. Toothache is to be observed in the inviolate—unverletzter—pulp. Also is it to be met with of spontaneous origin in persons otherwise healthy, just as spontaneous pain is met with in other organs. There lies no ground for imputing these pulp-inflammations to diseases outside the organ,—es liegt jedoch kein Grund vor, diese Pulpenentzündungen auf andere Leiden zurückzuführen.

It is common to find these inflammations referred to as nervous affections; such mistaken decision is the rule rather than the exception. If such pulps are examined after extraction of the teeth, there is generally to be found an enlargement of the vessels, even though the mass of the pulp seems tolerably normal. If doubt still remains as to the inflammatory character of the trouble, the explanation is declared by the progress remarked in similar cases. The inflammation is found to seize on the periodonteum, which quickly becomes involved. The tooth will now be found very sensitive to percussion. After this there can remain no doubt that the cause lies directly in the tooth. After extraction the appearances of inflammation are to be witnessed in the slight swelling of the periodonteum.

Observation of a sufficient number of cases will discover a fault in the diagnosis which places the cause apart from the tooth. Many obscure cases show themselves to depend upon the presence of minute dentinal nodules, these little bodies lying free among the connective tissue of the pulp in which they have developed. It is not necessary to the existence of these as agents of irritation that they be large enough to be seen by the unassisted vision, or that they be gross enough to be felt by sensitive fingers.

The pain in these cases is in the beginning very mild; by degrees it grows greater, but without truly localizing itself. That it is a nervous affection, one is disposed to accept, on the grounds that the pain is widely scattered, and that no complaint is made by the patient of any particular tooth. The inflammation, which, in the beginning, is truly confined to the pulp, extends itself to the periodonteum. This may occur after weeks, or it may be only after months. The tooth in this stage is found sensitive to percussion, and the pain becomes markedly localized. Mistake in diagnosis is not any longer possible. Likewise, one recognizes that the involvement of the periodonteum arises not out of any nervous affection, but out of a pulpitis. The anatomico-pathological explanation of the case is seen, clearly, to reside in the nodules of new dentinal formation in the pulp.

In the neighboring region of these new formations the blood-vessels are met with enlarged and tortuous; so much enlarged, indeed, as generally to be observable by the unassisted eye. The apex of the root of the tooth is found red, swollen,—auch gelockert,—and inflamed.

It must be apparent that these new formations, however, are not necessarily a cause of pain. In a multitude of cases in which they are to be found in the pulp is their presence attended by nothing remarkable. The observations made in the cases attended with the evil results referred to do not at all satisfactorily dispose of the condition. The few cases recorded where attempt has been made to afford any fullness are without profit.

If the suffering begins in a tooth which is shortly extracted, but a little time elapses before another is affected; this, too, because of the pain inflicted, is quickly sacrificed. So the pain continues—being seated first in one tooth, then in another—until all are extracted. In many cases there is exemption from pain for quite a time after the extraction of a single tooth. In others, as fast as one organ is removed the pain shifts to another. In this manner the mouth is soon rendered edentulous. A single year oftentimes suffices for the loss of all the teeth; other instances occur where the loss covers a period of five, six, or more years.

In some extraordinary instances there appear before us patients having unendurable toothache, which pain seems strictly located in a particular tooth, and yet examination of the tooth shows nothing wrong. In these cases one finds himself compelled to look to the nervous system for explanation; particularly if the person be weak and anæmic.

But these cases are, as we have implied, extraordinarily rare. Albrecht writes about them, but the examples offered by him are in no wise satisfactory. He describes this peculiar odontalgia as nervous, but one convinces himself very easily that it is in some way associated with an inflammation. True nervous pains are of rare occurrence, and the illustrations offered by Albrecht as his examples do not at all fit.

A. B. C.

(To be continued.)

PROCEEDINGS OF DENTAL SOCIETIES.

NEW YORK ODONTOLOGICAL SOCIETY.

(Continued from page 163.)

The following paper was then read, entitled "Filling Teeth with Soft Foil," by M. H. Webb, D.D.S., of Lancaster, Pa.

Primarily, we should consider that such intelligence as is requisite for one who operates upon dental tissue must be developed (which development depends very much upon the influence of the sense of touch), and that one must also possess genius before a definite and approximately perfect result can be attained.

Secondarily, we may take into consideration the materials, means, or appliances which aid in the attainment of such a result.

For the simple "filling" of a fissure or sulcus in a bicuspid or molar with pellets, cylinders, or the like, it may be best to make use of a gold which easily yields to pressure,—such a foil as the essayist terms "soft."

Any gold which has been so tampered with as to cause it to be in an impure state, or in a non-cohesive condition, should not be used, because the particles simply lie in juxtaposition, there being no affinity—no cohesion—between them.

The precious atoms, strong as they are "in solid singleness," yet cannot "exhibit enduring strength" unless the gold be closely packed and the combination of the atoms be dense. The law of affinity must be obeyed,—cohesion must not be impaired,—else an enduring, useful, and beautiful structure cannot be erected.

Since pure, and therefore cohesive, gold should be used for all operations which are intended to best subserve the purpose of tissue which has become disintegrated or been destroyed, and the highest type of operations is not attained by the use of pellets and cylinders, how, then, shall such operations be performed?

Take, for instance, a bicuspid or molar, where disintegration of the enamel of a proximate surface has taken place near the point of contact of such surface with that of the tooth adjoining, and where dentine has been approached, and the carious process has progressed to quite an extent under the plate of enamel.

Previous to the performance of such an operation the teeth should be pressed apart, so as to allow sufficient space to finish the surface of the gold by the aid of files, emery-cloth, and linen-tape and pumice, thus avoiding a permanent space between the teeth, excepting towards the work as in nature. When the teeth shall have again approximated, and the gold have come in contact with gold or with normal tissue, impactment of food between the teeth, to irritate the gum and to cause its eventual absorption, will have been thus prevented.

After the most valuable of all dental appliances—the rubber dam—has been adjusted, the cavity should be opened into from the masticating surface, for the reason that a better view of the parts can thus be obtained, and the operation more perfectly performed in this way than in any other manner.

The margins of the cavity should be made smooth, and be evenly finished by a fine, sharp "plug-finishing" bur, operated with a dental engine.

After the removal of all carious dentine (excepting where its removal might endanger or expose the pulps), a groove, sufficiently deep to retain the gold, should be made along the palatal and buccal walls of the cavity, and about where the enamel and dentine coalesce. The adjoining fissure, whether decay is visible in it or not, should be opened into, prepared, and filled in connection with the cavity upon the proximate surface.

If decay has not advanced so as to have involved dentine as far as the margin of the gum or the cementum, then the enamel and adjacent dentine should be cut away by fine burs until the edge of enamel shall be beneath the gum,—removed from near the point of contact, where disintegration almost invariably commences.

The grooves along the buccal and palatal walls of the cavity should be extended to, but not along, what is known as the "cervical wall."

Even when a cavity is quite well prepared, and the edges of enamel evenly and finally finished by files and emery-cloth, a fine operation, or a successful one, is not usually performed by the method of inserting pellets or cylinders and retaining, or attempting to retain, them by an instrument held in the one, while the gold in this form is introduced and "condensed" by a plugger in the other hand, nor by the use of a matrix, because there is no certainty of result—no positive evidence that movement of parts has not occurred—by this method of operating.

A half-leaf of light foil for small, a leaf for medium, and two leaves for large operations, should be folded into a tape-like form, so as to be about three, six, or ten lines in width. This gold should then be taken up with the foil-carriers, and cut across the width of it into parts about half a line or a line wide. Heavy foil should be cut in the same manner, but this foil cannot be taken up with the plugging instrument nearly so readily as gold prepared as just indicated.

When a cavity is prepared as already stated, a starting-point should be made with a small, sharp drill at the base (so to speak) of one of the grooves before mentioned, and about where the dentine coalesces with the other hard tissue of the part,—the enamel or cementum. This point should be so drilled as not to endanger pulp-tissue, and be only of sufficient depth to retain the small pieces of gold then to be packed into it. When the filling has thus been commenced, piece by piece should be passed over the flame of alcohol (although the gold should not be so treated as to work harshly), and then built on the portion already introduced and fixed in position, and against surrounding tissue and over the prepared edges of enamel, in such a manner as to keep the surface of the gold quite level, and to be certain that there has not been a part of it which has changed position in the least from the commencement of the operation to its completion.

In such cases, as in almost all others, all the gold should be impacted by aid of the mallet; but it is of the utmost importance in this, as in every part of the operation, that such an instrument, especially the electro-magnetic mallet, be properly used.

In relation to the electro-magnetic mallet, I will state that it is my desire that no one speak of any such instrument as mine, even though I have made one for my own use, parts of which have been differently made and adjusted and more compactly arranged than in other similar instruments.

Although the conception of the application of electricity to this purpose by Dr. Bonwill and Mr. Green is said to have occurred at about the same time, yet Dr. Bonwill produced the first practical instrument, and to him are we indebted for the electro-magnetic mallet.

Modifications have been made by others, but such of these changes as are of value add to, rather than detract from, the instrument, and thus increase, rather than cancel, the debt of gratitude we all owe its inventor.

When this instrument is properly understood, adjusted, and operated.

there is real pleasure in introducing and packing gold with it; but little more, if any greater, effort being required to do this than to wield a pen or pencil.

The electro-magnetic mallet should be used throughout an operation in very much the same manner as a pen in the exercise of the art of penmanship.

A Michael Angelo would chisel away a block of marble and bring forth, as it were, a beautiful form, but an operator upon dental tissue, who should possess genius akin to the artist just named, is first called upon to restore in gold that portion of tissue which has been destroyed by caries, and then, as the restoration progresses, to so arrange his work as to have it conform in outline and beauty to the original structure, and thus to make the final finish of it a less difficult task. All this can be done with greater ease and rapidity, and more perfectly, by the aid of the electro-magnetic mallet than in any other manner.

Dr. J. B. Rich, of New York. This method of introducing soft foil into a cavity is not new. It was well known in all its details, as described to-day, when I commenced practice. Neither are the instruments new; they were used before Mr. E. J. Dunning was born. This particular case that has just been presented to us is a cavity in the right upper first molar, proximate surface; the second bicuspid has been extracted, so that there is an uninterrupted view of every part of the cavity, which is represented as being in the center of a flat surface of the tooth, and as being surrounded by good strong walls on all of its sides. In fact, both from the situation of the tooth and the location of the cavity, it is the simplest and easiest cavity to fill that can be imagined. I need hardly to have said this, as the essayist admits that to be so.

Now, I wish to criticise some of the details of the process of filling this cavity as described to us. The operation commenced by placing a pellet of loosely-rolled soft foil in the upper left-hand corner of the cavity,—that is, in the angle formed by the cervical and palatine walls,—the pressure upon the gold to be applied in the direction of the cervical wall, and it was to be pressed into that corner firmly and solidly, but not quite as solid as it was intended to be,—the additional solidity intended for it to be produced by means of pressure applied to the pellet of gold that would be placed alongside of it, and also be in contact with the palatine wall. Now, this is bad manipulation: for that first piece of gold cannot be made as solid by the means described as it could have been made when the steel instrument was in contact with it. It ought to have been made as solid as it was intended to be before the next piece of gold was placed alongside of it, as the second piece would act as a cushion when placed between the instrument and the first piece, and prevent the pressure applied from acting upon the piece in the corner, and every additional pellet would, of course, lessen the effect upon the first piece. I will not dwell further upon the detail of the filling, but take hold of the main feature of the paper. The essayist has presented this case as an illustration of the advantages to be gained by using soft foil in some cavities. What is the advantage gained? He certainly does not mean to be understood that he can make a better filling in that cavity with soft foil than could be made with adhesive gold, for that proposition would not be admitted by any one in this room who knows anything about the merits of the two substances. As far as I am concerned, I deny any such assertion most emphatically, and say that very cavity can be filled far better with adhesive gold than it can be with non-adhesive foil; and this assertion of mine holds good as relates to any cavity that can be filled with gold. One of the advantages claimed for soft foil is that it will slip by the gold already in the cavity, and therefore can be more easily placed where it is wanted than adhesive gold. This is not so certain a result as the essayist would have us believe, for even this magical soft foil becomes very stubborn and uncertain by being manipulated; it does not remain the soft, yielding material that it is when taken out of the book, and it is quite variable under manipulation in the qualities claimed for it.

Now, there is no uncertainty about adhesive gold: the operator knows that it will not slip, and consequently he places it at once where it is needed; and I claim that placing it on the exact spot where you intend it to remain is a better principle than depending upon the uncertainty of its slipping qualities to enable you to place it where you desire it to be. In another part of this paper the doctor states that adhesive gold cannot be used in lateral cavities in the incisors where the anterior wall is thin, and in most proximate cavities, with as good results as can be obtained by the use of soft foil. Here I must differ with him again; first, as regards the incisors, adhesive gold can be adapted to such walls quite as easily as soft foil can, and without any more danger of cracking them; proximate cavities are the very ones of all others where it is important to be certain that every part of the filling is placed exactly where it is wanted; and if adhesive gold is packed hard, particle by particle, against the walls of such cavities, more will be known about the condition of the filling and its adaptation to the walls than it is possible to know if soft gold is shoved against the cervical wall in the form of pellets, and dependence is placed upon its yielding qualities for its close adaptation to that part of the cavity. The failure of fillings in proximate sides of the teeth is not, as a general rule, the result of imperfect manipulation, but is mainly to be attributed to the unfavorable conditions to which such fillings are subjected after they are put in the cavity. It is claimed in this paper that the slipping characteristic of soft foil is a valuable property in the construction of fillings. How different the same things will impress different minds! It was with this very slipperiness that I became dissatisfied in the first year of my practice in this profession, and it was the desire on my part to get rid of that peculiarity that led me to those experiments with gold which resulted in my being able to make it adhesive. And that day, the 6th of March, 1837, when I discovered that I could always make gold adhesive, I consider as the real starting-point of my professional life.

For years after I stood alone in the use of it; nobody would recognize its many advantages, and often, when I was endeavoring to impress upon the minds of others its great merits, my arguments would be met with the reply: "I do not want gold to stick; I want it to slip." From my stand-point,—believing as I do that the use of adhesive gold for filling teeth is the greatest of all the advances our profession has made,—I must express my regret that a paper which is retrograde in its tendencies should have been presented at a meeting like this; and if it were not for the plausible and able manner in which the author has presented his subject, which makes its teachings dangerous, it would scarcely be worthy of our notice.

Dr. L. D. Shepard, Boston. In answer to the remark made that the cavity in the proximate surface of the molar is one of the simplest cavities we meet with, I think the contrary is true. Proximate cavities in molars and bicuspids are the ones which try the skill of the dentists most, and which are most uncertain in their results; and a cavity of that nature, of that size or smaller, is of the class that it is peculiarly difficult to fill. This very case is one in which it is very difficult to fill perfectly, and it is a rock upon which I think a great majority split in trying to fill such cavities with cohesive gold.

Dr. J. B. Rich. Will the gentleman permit me to correct him? Dr. Dodge, in describing the cavity, says it was an upper first molar where the bicuspid had been removed. I cannot imagine any more easy cavity to get at, or one more favorable in situation.

Dr. L. D. Shepard. I refer to one spoken of by the speaker preceding Dr. Dodge. In regard to adhesive gold changing to non-adhesive gold, I would say that it is adhesive when it is freshly annealed. There is some change takes place, evidently of a molecular character, by which perfectly pure gold, cohesive when first made and freshly annealed, ceases to be so after being exposed to the atmosphere a month or so. It is pure gold still, but the surface is not of such a nature that union between the molecules can take place when they come into juxtaposition; in chemical language, the molecules cannot be brought into such neighborhood that they are attracted to each other at inappreciable distances; that, I think, is the explanation. The English term it "stale gold," which, I think, is a better term than soft gold, because it expresses the idea more fully. I have had opportunity for the past ten years to become convinced, from observation of the operations of Dr. Hawes, Dr. Tucker, and others, of Boston, that fillings of soft foil, introduced after thorough excavation, without the rubber dam or our present appliances for keeping the cavity dry, where the cavities had good strong walls, and were a little larger at the mouth than in the inside, are equal to any that can be made of cohesive foil. Such fillings as the essayist has described have preserved teeth twenty, thirty, and forty years in a wonderful way. It has been against my previous prejudices that I have come to the conclusion that non-cohesive foil, as I expressed it two years ago, in Detroit, is only to be used in filling teeth when, from the nature of the case, there is required the peculiar strength obtained from welded gold. The great secret is to so shape the cavity that the fillings shall be held in without retaining-points.

Dr. E. A. Bogue. Did the gentleman mean to say that *non-cohesive* foil was to be used when strength was required?

Dr. L. D. Shepard. I should have said *cohesive gold;* but after all, that which should engage our attention as the problem of the hour, is the fact that in reaching after beautiful results we are losing sight of the principles which underlie our whole profession,—saving of the most teeth for the greatest number of people. We are in danger of wrecking our profession upon that rock. Something must be done by which, through the length and breadth of this land, our forty millions of people can have their teeth filled at a less expense than at ten, twelve, or twenty dollars a tooth. People throughout New England, and I understand in the West, everywhere, in fact, are having their teeth extracted by the millions, because they cannot afford to have them filled. If we can save half the time which it now requires to fill such proximate cavities as Dr. Dodge has described, what an immense amount of good would be the result! This fact that the services of the competent dentists are beyond the reach of the average people of this country should be, if possible, remedied. We can afford to let them go away from our offices if they cannot afford to pay our price, but until the best resources of our art are brought within the reach of the many our profession has not fulfilled its mission, or risen to its highest sphere of usefulness to mankind.

Dr. George T. Barker. I rise to indorse Dr. Dodge's paper, and in doing so I want it distinctly understood that in paying this compliment to the doctor I am not going to introduce a negative by immediately proceeding to attack the position he assumes. There is a certain conservatism about his paper which I like. We have too many conceited pluggers in the different parts of this country who are in the habit of calling their operations, performed after the most approved ideas, "copies of nature." I take this exception, however, to Dr. Dodge's method as described in the paper. It has no particular merit in originality. In my practice in Philadelphia I have seen work that was done sixty or seventy years ago, by old Dr. Hudson and others; first-class work done precisely in that way. Of course they are difficult operations, but, at the same time, they involve no such difficulties as the operator of to-day is called upon to deal with. There is one thing in the paper that I like particularly well,—the minutiæ with which Dr. Dodge explains these operations. I do not know how any young man can be misled by the paper. There is an advantage in the very instruments which he introduces here. If you will notice you will see that they are wedge-shaped, and every force exerted in the manipulation of that instrument is extended not only on a line with the force you are exerting, but laterally. That tends to pack the gold more thoroughly and uniformly.

I agree with the gentleman who has preceded me, that we should endeavor to be practical in our operations rather than brilliant. Brilliant operations have their advantages, but, as the gentleman says, we should endeavor to do the greatest good to the greatest number.

Dr. Atkinson's statement, that if the filling made by Dr. Dodge was removed it would be found cohesive, brought to my mind an instance where I did remove a similar filling made by Dr. Dodge. There was no change of the kind described by Dr. Atkinson in that filling. The gold was in exactly the same condition as when inserted.

In regard to the statement that gold becomes non-cohesive only by the attachment to it of some foreign substance, that assertion is in contradiction to such authority as Abbey, manufacturer of soft foil. But suppose, for the sake of argument, that it is so, and that there is a certain percentage of iron on the surface of gold to prevent it from cohering. *If it protects the teeth, I do not care if it is putty.* The most important thing is to protect and preserve tooth-structure. It is not our first duty to practice dentistry as a fine art. Our duty is to preserve the teeth, and make the interest of the public our own.

Dr. C. A. Kingsbury. I rise to express the extreme gratification which the papers I have heard read this morning have afforded me. The first paper gave evidence that the writer is a genius, and I have no doubt is a most successful practitioner. There were many things connected with that paper which were exceedingly interesting. The appliances presented were somewhat new to me, and I have no doubt were of a valuable character. But while I express my pleasure in listening to that paper, in view of the numerous appliances presented in connection with our operations upon the teeth, allow me to suggest that there may be a tendency to run into too great a complication,—too great a number of appliances. I think the more simple we can make our operations, and the fewer the appliances we employ in performing them, the more complete, thorough, and perfect will be the results. Not that I would not indorse every appliance possessing real merit, or hesitate for a moment to adopt it in my own practice. In regard to the second paper, I think it has the true ring. In most respects it is above criticism. The use of soft foil in the manner which has been demonstrated in that essay is, in my opinion, the most successful way of filling the majority of cavities, particularly the class of cavities to which the writer has called our attention. It was in the year 1838 that I first commenced to use Abbey's soft gold foil, Nos. 4 and 6, and of course my observation from that time until the present has extended over quite a period. In the year 1840 I was operating in the State of New Jersey, and a lady who had been a patient of the elder Dr. Dodge happened to fall into my hands, and in her mouth I had an opportunity of examining, at that early period in my practice, a number of his operations in gold-filling. They were beautifully done. In connection with that incident, the lady gave me a professional card of Dr. Dodge with his fees marked upon it, which to me at that time seemed very exorbitant, the price for many of the fillings being ten dollars, but I have no doubt such fillings as those were better worth ten dollars than fillings carelessly put in would have been worth the small price of the gold foil employed. I cannot understand why any dentist should abuse soft foil, or ignore it in his practice. There is not an old dentist in this room who has not had an opportunity of examining fillings of soft foil which have stood the test of time in a great diversity of mouths, and under great diversities of circumstances. I met, not long ago, a gentleman who had twenty-five fillings of soft foil in his mouth, which had been in use for over twenty-five years. It is true that cohesive foil has not been used so long as soft foil. It is my conviction, however, that a larger proportion of gold fillings of cohesive foil will fail during the next ten or twenty years than fillings of non-cohesive gold. There is one point to which I wish to call your atttention, and that is, instead of preparing cavities with retaining-points for gold fillings, you may lay it down as correct practice that, in the preparation of cavities for filling, the general form of the cavity should be such as to retain the filling rather than depend on those retaining-points used by many of the practitioners at the present time. In many instances inexperienced operators, in the use of these retaining-points, have encroached upon the pulp to such an extent as to cause its death.

It has been stated here that non-cohesive gold foil is not pure, and cohesive foil is pure. It is no evidence that a gold foil is pure because it is cohesive. I have in my possession a quantity of Abbey's foil with five per cent. of alloy in it, which is as cohesive as any gold you can bring me, but its impurity does not militate against its value.

One other remark I desire to call attention to. A gentleman has asserted here that any man that does not employ an electric mallet in the insertion of gold fillings lacks skill and genius. Now, if that gentleman is the Michael Angelo of our profession, as a charitable man he ought not to denounce those of us who are only Canovas and Raphaels.

Dr. M. H. Webb. Dr. Kingsbury misapprehends me. I made no such assertion.

Dr. B. Lord. I did not get to the meeting in time to hear the first part of the paper read by Dr. Dodge, so that I did not get his reason for not condensing solidly the first piece or layer of foil, as he put it to its place against the upper or cervical wall. But the last speaker, Dr. Rich, says that he would make the first piece or layer solid, and so condense each piece as placed. Now, to my mind, this is a very important principle in the discussion of the question of the use of soft gold and also of tin foil, and of filling teeth, and one upon which the failure or success of the operation very much depends.

I will say a few words about it, Mr. President, although I would much prefer to perform the operation than to state *how* I would do it. I do not wish to condense solid the first piece or layer introduced into the cavity, but put it to its place carefully, so as not to tear or cut it, and, if possible, make some gentle pressure against it to secure it properly. Then I would carry the second piece fairly into the first, and with sufficient force to both unite the two and condense the first piece or layer, solid, against the wall of the cavity.

If the first piece or layer is made solid, the second cannot be carried into it, and the first piece being made solid will be very liable to be displaced by putting the second against it unless it is secured in a pit prepared for the purpose, which I do not like, as such pits are likely to weaken the walls. By keeping the surface of that part of the filling already placed and packed sufficiently soft to receive the successive layers the whole mass is interlaced and united,—and, sir, this is quite consistent with making the mass below the surface solid against the bottom and walls of the cavity. Of course, much judgment must be exercised, and great force used in uniting the layers,—one movement of the instrument is often better than two or more. In addition to uniting the layers as I have described, I wish to so place and pack the whole as to allow the surface to project beyond the margins of the walls, so as to admit of a good deal of yielding of the whole mass under the general surface-pressure, as this will the most effectually mat and unite the surface below it, and still further condense towards the walls, than can be done in any other way. Into this surface I very often introduce short strips of cohesive gold, particularly into the last piece of soft gold used, and when the cavity is small it is readily secured—anchored—in the surface of the soft gold before it is consolidated. It is in this way that I secure cohesive gold when I wish to build out beyond the margins.

I am an advocate of soft gold. I thoroughly believe in it,—it is more reasonable and philosophical, as it can be controlled in the cavity,—it can be handled and placed without getting stiff and hard before you want it to. The whole mass will yield more or less to general pressure, which is one of the most important principles in the packing and condensing of soft gold or tin foil. It cannot be made as hard as cohesive gold,—it can be made quite sufficiently so to exclude moisture, and this is all that we want. Mr. President and gentlemen, it is not solidity, beyond a certain point, but perfect adaptation to the walls of the cavity, then sufficiently solid throughout to be impervious to fluids,—and this, I contend, can be secured with soft gold or tin foil more simply and with more certainty than with cohesive gold. It has been said here that only cohesive gold is pure, or that all soft gold is likely to have more or less alloy in it. Is that true? It is at least an open question whether a very small quantity of tin does not make gold softer and tougher. I myself believe that it does. The idea, Mr. President, of putty, as it has been alluded to here, is a grand idea. All understand it,—I need not explain.

Dr. J. B. Rich. I do not.

Dr. Lord. Dr. Rich understands that putty is soft, that it is a plastic material, and he understands that a plastic material can be put into a hole with great ease and accuracy. *Putty*, gentlemen, if it will answer the purpose; but as it will not, let us use not *putty in fact*, but *putty in principle.* Gutta-percha stopping is an invaluable material,—better than gold in many cases. Tin foil is better than gold in many cases; having greater plasticity, it can be more readily adapted to the walls; and I verily believe that if we were to use tin foil and gutta-percha a great deal more than we do, a greater number of teeth would be preserved throughout the length and breadth of the land.

Dr. J. B. Rich. I desire the gentleman to understand that I merely wished an explanation. I do not wish to be considered as making my interrogation in an impertinent spirit.

Dr. C. E. Francis. In introducing fillings into the teeth there seem to be two principles to be considered,—solidity and adaptability; the last of which I should consider the most important. A cork is much better than a glass stopper for a bottle, and the best-filled tooth is the tooth which is the most perfectly sealed. I consider soft foil much better than cohesive foil for packing against the walls of a cavity. A great many solid fillings turn out in a short time to be no better than loose bullets.

Dr. T. C. Stellwagen. I desire to call attention to the first paper, which appears to have been somewhat overlooked in this discussion. I would like to ask what the experience has been with regard to the use of screws for the purpose of holding gold fillings in position. It seems to me that it tends to produce a weakening of the filling at the point, or on a line with any two of these screws, the effect being precisely the same as if a hole had been drilled into the filling; and if the filling should break anywhere, it seems to me it would be more likely to do so in a line where the greatest number of screws had been inserted.

There has been a strong disposition for several years in the profession to neglect a most important point, namely, the preservation of the teeth. That seems to be a secondary consideration to the insertion of a magnificent gold filling. The great reason which I urge against retaining-points is, that to some extent they weaken the natural tooth, especially if they are put in all over the floor of the cavity. They produce the same effect upon the tooth which the screw does on a filling, and it is not good surgery to weaken a tooth by a retaining-point if we can avoid it. It is far better, as has been said, to form the cavity so as to retain the filling rather than to trust to mere retaining-points.

As to obtaining solidity, there seems to be an idea at the present day which culminated a short time ago with the notion of buttering gold into a cavity. There seemed to be an idea that it could be buttered by means of ivory points, and afterwards by means of gold points. If solidity is required, apply pressure,—weight, avoirdupois, —the electric mallet is essentially defective, I imagine, in this very particular. In attempting to produce solidity by means of rapid hammering with a fine-pointed instrument we get surface scales,—we get the surface exceeding in hardness that of the deeper parts. I take it that the electric mallet too often becomes a mere producer of surface scales, and the filling itself a series of scales.

What we want is a mallet which will give a push with the blow, and hold it just as a pile-driver drives the pile. It is a dead weight that we want, and that property the electric mallet does not have. It is simply a quick vibration, due to the fact that the keeper is drawn down upon a spring, and the moment the electric current is broken that spring throws the weight back, producing merely a quick vibratory stroke.

Some two or three years ago, on occasion of being here in New

York at a meeting of this association, I heard a remark from a gentleman which delighted me very much, and which I never fail to impress upon my pupils, to the effect that he thought cavities should be filled with *judgment* as well as with gold. Now, sir, if cavities are not to be filled with judgment, then the sooner we have machinery for the purpose of doing the whole process the better.

Dr. W. G. A. Bonwill, Philadelphia. Some twenty-two years' experience in the use of foils has convinced me that as perfect work can be made in contour fillings with Abbey's old-fashioned non-adhesive foil, as with any of the best adhesive foils in the market, owing to the facility of manipulation. That a contour filling, for instance, upon the point of a central incisor can be made with No. 15 non-adhesive gold is, I think, something in its favor.

It depends very much upon the manipulation of Abbey's foil whether it is lasting and durable as a contour filling. If you wish to condense it with hand-pressure entirely, it can be done in two ways: with a sharp-pointed instrument by interlacing, or by heating the non-adhesive gold to redness, and using a flat-pointed instrument. Using it in this way enables you to produce as fine a contour filling as can be produced with adhesive gold,—that is my experience. In filling against the walls of cavities, I prefer to heat the gold only slightly over a piece of Russia sheet-iron.

It has been said that this foil is not cohesive. I can take Abbey's *old-fashioned* foil, and, commencing at one point, build up one piece upon another, and make it adhere as thoroughly by the impact of the mallet as you can any adhesive foil.

I am not here to advocate the *electric mallet* at all, but I will simply say that experiments with it have demonstrated that more foil, soft or adhesive, can be packed into a given cavity in a given time by the use of the electric mallet than can be packed in with an eight-ounce lead mallet, or any of the heavy mallets in use.

Dr. J. W. Clowes. I have been waiting patiently for somebody to start an original idea here. I think this subject of the comparative virtues of cohesive or non-cohesive foil is well-nigh exhausted. Any dentist, deserving of the name, can fill a cavity with either of these materials, and do it well. The question is not whether we shall use adhesive or non-adhesive gold, but it is, What is the best plug we can apply in a given case?

Such a cavity as the one represented before us upon the board should have the greater portion of it filled with a plastic substance, which will become hard and solid. Do not worry your patients to death. Fill with some plastic substance, and then cap with gold, either adhesive or non-adhesive, and you will have a filling which will last until the man is done, and he will be *fond* of dentistry after that. The papers which we have heard are very beautiful, and they illustrate the great advance which has been going on, not only in operative dentistry, but in other departments of our profession; but they are not of the most practical character. The remarks of the gentleman from Boston (Dr. Shepard) had the right ring to them. He advocated the claims of the cheaper substances for filling teeth, and very justly remarked that the great popular demand is for a cheap preservative. But there is another point of even greater importance than that, and that is *prevention.* "An ounce of prevention is worth a pound of cure." That is operative dentistry of the highest order. Our profession is filling and filling; but we must frankly confess that our failures outnumber our successes. We must, of course, strive to do good work; but we should strive more, to prevent the necessity of filling at all. We must strive to prevent disease. *We must give teeth room in the jaw; we must separate teeth.* Contact, gentlemen, among human teeth is always dangerous. There is no permanent salvation of the teeth except by separation. I had a case illustrating the truth of this only yesterday: a young man about eighteen years of age, who has been under my professional care since early boyhood. Owing to his having an exceptionally fine development of jaw, I had deviated from my usual course of practice, and had not extracted the sixth-year molars. Upon examination yesterday I found cavity after cavity insidiously undermining his teeth. I had brought this trouble about by neglecting the precaution of removing the sixth-year molars. In order to save teeth we must separate them; and don't be afraid to cut away the enamel, for the enamel has little to do with the prevention of decay.

Dr. J. B. Rich. This discussion has taken a wide range in regard to the substances that may be advantageously employed in filling the teeth. Some of the opinions expressed here to-day in relation to this subject are certainly of a strange character, considering that the persons now in this room represent a profession whose members claim equal rank in ability and scientific acquirement with the members of the professions called learned.

I wish to make a few remarks upon the impressions that this discussion has made upon my mind, and also in expression of my views upon what should be the characteristics of the substances to be used in filling teeth. First, in regard to the impressions made upon my mind by the discussion, dentists designate their occupation as a profession, which, according to the general acceptation of the term, means a calling, the practice of which is founded upon well-defined principles; and it is understood that those who practice a profession are thoroughly versed in its principles. Now, is this the fact in relation to the majority of our profession? It ought to be so, and all professional effort to be intelligent should be grounded upon scientific principle. But the impression I have received while listening to this discussion this morning is, that the knowledge of correct principle is not as general among the members of this profession as it should be. Preserving the teeth by filling the cavities that have been formed in them by the ravages of decay, is that department of our professional labors in which we employ the most of our time; it is, in fact, the great feature of our calling, and it behooves us to thoroughly understand the principles of that important branch of our art.

The main features of the principles that should govern the performance of that operation are briefly these: after due preparation, the cavity should be filled in such manner that the material used should be in close contact with every part of the surface of the cavity, so as to make a perfect liquid- and air-tight joint, and that this material should be of such peculiarity, and so manipulated, that it could not move from its intended position when once placed there, and should not be unsightly.

These are the principles of preserving teeth by filling the cavities made in them by decay. Now, what material will best meet all of these conditions and accomplish the desired result? The best material is certainly that substance which will most effectually take the place of the lost portion of the tooth without any attendant injury to the parts that are intended to be preserved. Adhesive gold is the only substance that, with proper handling, will fulfill all of the conditions required. No other material that is durable and not unsightly can be placed in such close and firm contact with the surface of a cavity as this form of gold can. Reference is often made to the fillings put in fifty or more years ago, and as these fillings are occasionally met with in good condition, they are brought forward as evidence of the superiority of soft foil. But this is not a fair argument; dentists of those days selected as salvable only those teeth whose cavities were of the simplest character, and with good, strong walls; but if the sides of the cavity were not strong, its form tortuous, or it was difficult to reach, they did not fill it with gold, they either filled it with tin, which was considered temporary, or they pulled the tooth out. There is one name that is mentioned oftener than any other in this connection, and that is the name of Edward Hudson, of Philadelphia, now deceased, his fillings being often found in good condition after fifty or more years of service. I had the good fortune to know him well, to be honored with his friendship, and to be well acquainted with his mode of operating, and I have no hesitation in asserting that he was the ablest man of his time in this profession. He possessed all the knowledge in relation to it that was then extant, and was far in advance of his contemporaries in skill and thoroughness in what he undertook to do. But, like all others of that time, he only filled simple cavities, and whenever his fillings are met with they will surely be of that character.

The skillful dentist of to-day may possibly make more failures than Edward Hudson did, but it must be remembered that he attempts more; that in every department of our profession—the sphere of which has been greatly enlarged since that time—he successfully performs operations which the dentist of fifty years ago did not even dream of undertaking. The complex and wonderful fillings of to-day were then unknown. The rubber dam, the mallet, and the hundreds of ingenious appliances which are now within the reach of the dentist, have rendered practicable operations which, fifty years ago, were impossible; and foremost of all of these elements of progress must be ranked the use of adhesive gold.

As probably the first person who recognized the advantages to be gained by the use of this kind of gold, and certainly the person who has used it exclusively for the longest time, I claim to know something about its qualities. It has proved of inestimable value to me, and I shall always become its champion when any of its great merits are questioned, and whenever I hear a dentist advocating the use of soft foil in any case, I am convinced that he is not thoroughly acquainted with the properties, merits, and proper mode of manipulating adhesive gold; for if he were he could not conscientiously advocate the use of soft foil, and this opinion has its foundation in the reasons that I have stated before, that there is an infinite variety of operations that can be performed with adhesive gold that cannot be done at all with soft foil, and that there is nothing that can be executed with soft foil but can be better done with adhesive gold.

In the department of filling teeth, the highest ambition of the dentist should be to attain the greatest mechanical perfection possible, and to insure such result he must use for that purpose the substance which possesses the greatest number of the qualities necessary to success. I consider adhesiveness as the most important of all the qualities that any substance should have that is to be used for filling teeth.

What is the difference, chemically and physically, between cohesive and non-cohesive foil?

Dr. C. A. Kingsbury. I desire to say a few words to counteract what I conceive to be the erroneous tendency of Dr. Rich's remarks, and in vindication of those who have spoken in favor of soft foil. As a representative of that class I desire to say that I have used cohesive foil since its first introduction, and I am using cohesive foil constantly in certain cases; but, inasmuch as cohesive foil is advocated to the exclusion of soft foil, we appear as the advocates of the latter material.

In a majority of cases in our practice soft foil is preferable, because it possesses that plastic property which has been referred to; because it is more easily adapted,—capable of being more perfectly fitted. To illustrate: I would use non-cohesive foil on the same principle that I would use a bibulous paper to drive out the moisture in a cavity in preference to a pellet of letter-paper. Non-cohesive foil corresponds to bibulous paper, and cohesive foil answers to letter-paper. The latter will crumple up and be full of holes, while bibulous paper is yielding and flexible, may be carried home with a perfect adaptability to the walls of the cavity.

Dr. W. H. Dwinelle. I think Dr. Rich's question can be answered very briefly and very simply.

Solomon, wise as he was, and familiar as he was with the uses of gold, was not acquainted with all its wonderful and beautiful properties. It has been reserved for our profession to develop gold and bring out its latent qualities of usefulness. It was reserved for our profession to bring out the fact that gold—pure gold—is always adhesive. That is one of the principles that underlies gold, and is one of its distinguishing characteristics. This being the case, our modern gold-beaters, in order to make soft foil, have introduced in small quantities various metals, such as silver, copper, platinum, etc., to give it the requisite degree of softness. The old Abbey's foil, used in the early part of our practice, did not possess this quality of adhesiveness, because it was not made absolutely pure.

Our first adhesive foils were sticky and harsh. They did not have that quality of mellowness which characterizes our best adhesive foils now.

The skill now attained in refining gold has enabled our foil-manufacturers to produce foils at once adhesive and soft and mellow in texture. Gold foil is made upon a sliding scale, so to speak, from absolute purity and adhesiveness down to absolute softness and non-adhesiveness. One word more. I desire to put in a plea for soft foil, while at the same time I recognize the great value of adhesive foil. I think there is no one here who has been a stronger advocate for adhesive gold, especially in the form of crystalline gold, than I have been, but at the same time I am eclectic, and desire to take broad ground in all these matters. The great object of our professional effort should be to save teeth, and in order to do that something must be used which will hermetically seal the cavity. Why do we use gold for this purpose? Because it is the most indestructible of all metals or materials, and when thoroughly packed and consolidated will best resist the action of mastication. In order to bring gold into that condition which will best serve the purpose, so that it will act as a corking, a plugging, or a hermetical sealing, we must bring it into that condition in which it will be most pliable, and adapt itself most readily to the walls of the cavity, with the smallest amount of force.

I do not wish to say anything against adhesive foil. I regard it as a great and valuable acquisition to our profession. I believe Abbey's old-fashioned soft foil is capable of being made as hard and condensed as completely as any foil in the world. And I will agree to put more soft foil in a given ingot, under a given pressure, than it is possible to put of adhesive foil. At the same time I say nothing against adhesive foil, although its use is often abused, especially by the hand of the young and inexperienced operator. We must always adapt ourselves to the circumstances of the case before us, success being derived from the *manner* rather than the material.

The first time the adhesiveness of gold was reduced to a practical system was through crystalline gold, when contour fillings were first made known. The adhesiveness of gold foil was afterwards reduced to a system, with results which are familiar to you all.

Adhesive or "sticky" foil was sometimes produced, but it was always accidental, and was ever regarded as a misfortune by the manufacturer. Understanding now the laws that underlie this department of metallurgy, we are enabled to produce it at will, and hence the many excellent qualities of adhesive foil.

I introduced crystalline gold to the profession because that it was not only adhesive and capable of restoring the contour of the teeth, but because it possessed the quality of softness and mellowness to a greater degree than any form of gold hitherto known. It also has another quality which to this day gives it precedence over all foils of whatever kind. When properly manipulated, it is *harder* than any of them. This may seem extravagant to thick-foil men, but it has been repeatedly demonstrated, and can be again.

Unfortunately, the crystalline gold referred to, by carelessness or incapacity in its manufacture, has been subject to great fluctuations, and is often of a very indifferent quality. I am, of course, referring to results obtained by it *at its best*. Measures are being taken to supply the profession with an article which will be equal to the best products ever made, and of a uniform character.

I have massive compound gold stoppings of soft foil covering the entire grinding and approximate surfaces of molar teeth, which have been in use for thirty-seven years in my mouth, and they are as perfect, bright, and unbroken in their surfaces as the day they were put in.

I have seen beautiful stoppings of soft gold foil in teeth filled by Dr. Rich nearly or quite forty years ago. I do not believe that to-day he, or any one, could dislodge them with a tooth-pick, even though it were a metallic one.

(To be continued.)

FIRST DISTRICT DENTAL SOCIETY.

A REGULAR meeting of the First District Dental Society was held at the office of Dr. W. T. Laroche, on the 8th of January, 1878.

Dr. Wm. H. Allen in the chair.

INCIDENTS OF OFFICE PRACTICE.

Dr. J. S. Latimer. I want to know how Dr. Perry gets along with the electric mallet.

Dr. Perry. I don't know that I want to say anything about it. The reporters are here and will put me on record, and in three or four weeks I will have another opinion about it, because I have changed my opinion in reference to it and am gradually changing. I must say I am liking it slowly; but I still have a doubt if we shall condense gold as perfectly and as easily to all concerned, both patient and operator, as with the heavy lead mallet. I don't know what time will develop. We know our Philadelphia friend, Dr. Webb, is a firm believer in it, and does his work beautifully.

Dr. J. S. Latimer. Not rapidly.

Dr. Perry. He says rapidly. I have never seen him operate, and don't know what the rate of speed is.

I use all methods for condensing gold. I use hand-pressure, and the electric mallet, and the lead mallet. I have different instruments for condensing gold,—some of Dr. Dunning's diamond points,—a few of the old-fashioned four-tined instruments, the tendency of which is to carry the gold down together. It is a sort of compromise between serrated points and diamond points. I use Williams' cylinders in the soft form, never using them in cavities with four walls. I furthermore work rapidly and satisfactorily by using the four-tined instruments with hand-pressure.

I use the electric mallet only in a limited number of cases. Then the lead mallet with Dr. Varney's instruments, or nearly his instruments, with fine, smooth points; and then the lead mallet, using gold in a semi-cohesive state.

My experience teaches me that with the electric mallet the gold must be cohesive in all cases. I have not been able to use it with semi-cohesive gold. I don't know that my experience will correspond with others', but I am not so well satisfied unless I use the cohesive gold from the start. I use small pieces, condensing each piece. The heavy lead mallet condenses deeper, so that the first piece need not be immediately consolidated. The electric mallet cannot be trusted to work in this manner; it does not condense deeply at all. When I use the lead mallet I have no doubt about it; I do not fear that I will miss some point; but for delicate work I have never seen anything to equal the electric mallet. For large fillings I don't know anything equal to the lead mallet used by Dr. Mills, Dr. Atkinson, and, I think, Dr. Brockway.

I must say just a word in favor of soft gold in certain classes of teeth. In certain places, where it does not seem wise to cut through too much of the tooth, I prepare the cavity to use the straight instrument, and condense from one direction. I don't think it is right to ride a hobby, and use a single set of instruments. I remember Dr. Atkinson saying that I used too many sets of instruments, and lost power for that reason; but I still think it is best to be able to operate with any instrument and with any method, because occasionally there are cases where a different method may be used to advantage, and once in a while I use the old diamond point with soft gold foil and operate to my entire satisfaction, never having a blue line coming around the filling. And just here I must relate a case of two fillings which I put in four years ago. I wish Dr. Elliott was here, and I am sure he would second what I say. They were grinding surfaces: one in the right superior molar and one in the left superior molar, both in the same mouth, filled in 1874, if I remember rightly, one with the Abbey soft gold and with Dunning's diamond points; on the left side using the hand merely. The tooth on the right side was filled by the hand mallet and with cohesive gold. Those fillings were put in by different methods, and you will see what the results will be in a few years. Dr. Elliott thought that the soft gold put in with nothing but the diamond points, without the mallet or other instrument touching it, was the best. There was not a fault in it. It was as perfect as the moment it was finished. In the other filling there was also a fine finish around the edges; it only was soft to the burnisher; the edges so perfect that when I saw it I thought it had been filled with soft foil.

Dr. Atkinson. I need not say anything after Dr. Perry. He has said he would *learn* to like the electric mallet slowly, but I never expect to like it as well as the heavy lead mallet.

Dr. John Allen. That opens a door for me, with reference to hand-pressure instead of the mallet at all. I believe there are instances where the mallet can be used to advantage; but my impression is that as good fillings can be made by hand-pressure as a general thing as by any other means, and especially by those *automatic* instruments. My impression is that fillings have stood the test of time as well that have been put in by hand-pressure as in any other way, and when I look back I see fillings which I put in thirty and twenty-five years ago that are doing as good service to-day as they ever were, all put in by hand-pressure. And I have not the pleasure of seeing any that have been filled by any other process that are doing better or lasting longer. It is very certain, however, that we are in a progressive state as a profession. I am not going to condemn, but it does appear to me that I have heard of more failures in gold fillings since these instruments have been used, than I used to hear of when we filled teeth by hand-pressure. My son goes with the current and fills teeth in the modern style, although he uses hand-pressure some; but I can show you in this city fillings that I put in thirty-five and thirty-six years ago, that I know are saving the teeth as effectually as any fillings I know of put in by the more recent improvements.

Dr. Mills. I would like to take issue on that ground. I would speak of a case I filled in Brooklyn fifteen years ago in the mouth of Dr. Jarvie. The filling lasted about five days, and the tooth has never been filled to this day. It is as good as the moment the filling came out. That *was* a filling! I saved the tooth anyhow.

I have been quite radical in my method of practice, and if I have modified it at all it has been to make it more radical. I have been floating about considerably, and have seen many operations from a good many men's hands, and I have learned something about operating. In Philadelphia I learned the use of cylinders. I never before saw the method of putting them in. In Baltimore I saw cylinders used by Dr. Coy. I had a curiosity to see his method, which is entirely different from Dr. Spaulding's. Dr. Spaulding filled a tooth entirely with cylinders, whereas Dr. Coy's plan is a modification of that. I saw while there a good many fillings put in with cylinders, and found some most excellent fillings on the crown surface. Yankee-like, I tried it, and I must confess that, from the practice I have had in that method, I find there are places where I can make use of cylinders. The class of cases I might enumerate might be the extreme; but there are places, as a badly-decayed proximate surface on long teeth where the cavity dips down on the gum, where you can take hand-made cylinders (which are different from the machine-made), and pack them with care, with a right-angled instrument, and by a certain kind of pressure you can get a solid mass, bringing the gold solidly to its place and making a great saving of time and getting a very firm adaptation to the wall of the cavity. On a filling of that kind you can make a most beautiful surface. I would do the same thing with cohesive gold, with the heavy gold, and with the heavy mallet. But in many cases there is an immense saving of time by the use of cylinders, with as good results. Use them in proximate cavities, finishing off with cohesive gold, and you accomplish the operation with greater ease to the patient and saving of time to yourself. That is something I have learned, and it is good sound practice. My chief pet idea in filling cavities with gold is in the employment of convex, smooth instruments with cohesive gold. The instrument which I brought out seven or eight years ago is in principle a very excellent one, and it seems to me every man must see that in that instrument we have an illustration of produced lateral pressure by beating. We have the packing point in the center of the instrument; and I am able to pack cohesive gold and to spread it about the walls of the cavity, and when it is applied to the margin we cannot conceive of the adaptation being more perfect. One needs only to apply it to be convinced. In an experience of seven or eight years the idea has grown upon me, and it is now a comparatively easy thing for me to make such fillings. To speak in a general sense, filling teeth is a very easy thing with me, though I am not satisfied with every operation I make. Filling teeth has been very much simplified in my hands, and I think heavy gold is one of the biggest things in dentistry; though other men may do better work with other gold.

Dr. J. S. Latimer. One gentleman said he did not notice so many failures formerly as he has lately. Before the use of the cohesive gold he noticed less failures than since. There may be two reasons for that without impeaching gold: One is that he sees many hundred more fillings than he saw before,—many more are inserted; and another reason is that frail teeth were not filled with *any* kind of gold formerly. They were extracted, unless they had the walls all intact. We were not in the habit of restoring contour. It was a very rare thing to see it done, and a very difficult thing to do, without cohesive gold. With reference to my own practice, Dr. Perry has given my ideas as I have had them for some time as regards the advantages and disadvantages of the electric plugger and the heavy mallet; the lead mallet, being a compromise with the patient, going deeper, whereas the electric mallet surface packs, and requires that the gold underneath shall be very limited in thickness. It seems to me as good a way as any to use it with very heavy gold, say 120, in narrow ribbons, running back and forth on the filling. It might do to go around the walls with something else; I should not want to pack with it around the walls. The lead mallet in my hands I have more confidence in than in the automatic, which, to my mind, has one very decided characteristic. When I want to work around the edge of the wall where I am liable to put the instrument when I don't wish it, I don't want to have a *push* that is going to follow up and *cut* where I don't want it. With the lead mallet the moment the blow has ceased that is all there is of it; it does not go beyond the edge of the wall; whereas with the automatic I have all the effect I would have from mere hand-pressure, with the impact of the mallet besides. But I never feel quite comfortable packing, for instance, around the cervical portion of the inferior third molar. Buccal and grinding (including the anterior distal and buccal) surfaces are very troublesome to manage. With the automatic I should feel uncomfortable going around that distal wall. With the hand mallet there is no danger. Another reason why the gentleman to whom I referred hears of more failures now, is that men are becoming honest. It is very strange men are getting courage enough to say "I failed;" but there are men who have not this courage, but they have the combativeness to pitch into men who admit that they made a failure. However, those men will die out after a while, and honesty will survive. Honesty is contagious. I remember some years ago that two or three dentists confessed that they could not get all the pulp out of the roots of teeth, and I heard of them two or three years afterwards. It came around that often in the old New York Society gentlemen of standing in the profession, some standing at least, admitted they could not get the pulps out of the teeth they filled. They tried, but did not succeed; they could not do it. It was mentioned by the speaker as a sign of hope, that it meant good. Thirty years ago very few men would confess that they made failures at anything; everything was successful, and they would not tell you how they did it, but they did it! They kept it to themselves, and the failures were not related. Now we hear of them, and that is one reason that the gentleman probably hears of more failures now than he did formerly. I received a very severe lesson yesterday. The case was as follows: I did not cut as much as I wanted to in preparing a cavity, because the walls were exceedingly sensitive; and out of sheer compassion, but mistaken compassion, I filled before I had made the excavation of the main portion of the cavity, so that it would be self-sustaining, relying upon the grinding portion, which was less sensitive. I found out when I cut it down that the filling was not properly anchored, and took it out and refilled at my own charge to-day. But you may imagine that the patient did not have the rubber off the tooth this time before the excavation was complete, though it made him cringe. Every time that I make a failure of that sort I declare by all that is great and good that I never will do so again, but the time comes round and I make the same failure.

Dr. John Allen. I did not refer so much to the *kind* of gold that was used, for many years ago the distinctions were not known as they are now; but my remarks in reference to hand filling were intended to apply not only to packing the gold, but to the previous preparation of the cavity by hand instead of by any machine, especially in teeth which are so much decayed as to be tender at any point on pressure, and liable to crumble. Such teeth can be better prepared by hand than by any engine, I think; as in the case of a *weak* tooth; where the edges are thin, and where I think there is more risk of fracturing the edges. It is in those cases, more especially, that the hand is preferable to any instrument. My mind runs back to such delicate cases where I can feel with my fingers just what I am doing, and I feel I am doing just what the case requires, and no more; whereas, if I cut or strike it with something else, I have not the same certainty, the same delicate feeling, with the machine, that I have with the fingers. Now with reference to contour fillings. I know that is quite a point these days, and yet there are some dentists who admit that contour fillings, as they are carried perhaps to the extreme by some, are not what are desired. Take, by way of illustration, the different cases where a contour filling is required in the front teeth. I will refer to a case that occurred a short time since in our office. A gentleman got a severe fall and split off half of one of the incisors, and it would require under ordinary circumstances, and with most dentists, a contour filling. The nerve, however, was not exposed. There was no cavity, and instead of putting a contour filling on that tooth we cut it out and prepared a good retaining point, putting in those little screws; and, instead of making a gold plug, ground out a portion of an artificial tooth, and fitted it on by means of the screws, and got a most perfect result, using oxychloride of zinc to retain it. The result is more pleasing to the eye and is perfectly practical, and I therefore am not so great an advocate of contour filling as some others. I think we can do much better. I admire a handsome gold filling as much as any man living; but at the same time there are cases where I can piece teeth in that way and make a far more sightly tooth than with gold. In cases where the decay is in front, where it would be almost certain to show, an artificial piece can be inserted in that way which can scarcely be detected.

Dr. Weld. I have been very much interested in what has been said this evening, as it seems to me that you treat dentistry in the light of science more than in the way of art. Art is that which depends on practice and skill; and knowledge depends upon the truth concerning art. Now we have art in the clinics, and we have knowledge here. We say knowledge is science; we say the truth ascertained is science: so in that light, I suppose, dentistry can be considered science. I remember a few years ago, when I gave up the study of dentistry for the study of law, that the whole object of the first lesson was mainly to impress on the mind that law was a science, and any proposition laid down could be deduced from well-recognized principles. The first case I lost; not because my client was in the wrong, but because law was a science. It would seem that in this meeting you are trying to deduce principles from unknown truths. I was taught to fill teeth on the wedge principle, and I have never given it up. I remember a clinic not long since, in which there were two small cavities,—wall-cavities in a superior molar. The operator was a good one, but it took him two hours and a half to fill two small cavities. He used extremely small pieces of gold, and every piece he held over the flame of the lamp until the edge of the gold was actually fused. Now, I don't see there was any science about that, because there was no knowledge displayed as to the laws which relate to gold. There is no art about it, except that which relates to the blacksmith.

I went into a dental office not long since, and I found the dentist, a good operator, at work upon two cavities in the superior bicuspids. They were proximate cavities, face to face, wall cavities. They were at least an eighth of an inch from the crown. This dentist took an engine, and burred up from the crown, through an eighth of an inch of good bone, to get to the small cavities, that he might use the mallet. In my opinion, if he had filled with amalgam, it would have been proper treatment. Those two cavities could have been filled with soft gold, and with the burnisher the gold could have been burnished down, so they would have remained there forever.

I remember a few years ago, seeing a contest between mallet and hand-pressure. I saw the dentist who advocated hand-pressure grow red in the face, and the perspiration roll from his face in the vain effort to get as much gold in the cavity as was supposed to be introduced by the mallet. The gold was taken out, and then weighed, and it was found that there was more gold introduced by the mallet than by hand-pressure. It was argued from this that the salvation of the tooth depended on the amount of gold that was put in the cavity. And yet, only a few weeks ago, I saw a filling which had been worn for nearly forty years; it was put in by hand-pressure. It was good, and yet with the mallet I could have introduced more gold into that cavity. Well, I considered the deduction from the result of that contest as wrong. I don't think that the salvation of the tooth depends on the amount of gold put in the cavity, but it depends to a great extent on the manner in which it is introduced, and the manner in which it is pressed around the walls of the cavity and *finished;* and I contend that you can finish up gold, especially for proximate cavities, and have a closer contact with the walls of the tooth by hand-pressure, and save more foil than you possibly can by using a mallet. I don't wish to say anything against mallet-pressure and its usefulness in filling large cavities. I am willing to give it due credit for its every accomplishment, but in so doing I must say one word for soft foil, and its usefulness in filling small cavities; for it has proved a great boon to thousands of our fellow-creatures.

Dr. Francis. People living in different parts of the country, we find have ideas peculiar to the locality they reside in. A man will go into a new town, and put up a Gothic house, and in a little time up go a thousand Gothic houses. Another man will put up a Mansard roof, and a thousand others do the same. Of course, there are some individuals who will always stick to old-fashioned notions, or have ideas of their own in regard to filling teeth. Formerly dentists condensed gold with old-fashioned blunt instruments with huge ivory handles; somebody introduced fine points—sharp points, and so those big pieces of ivory were thrown aside. After a while serrated points were introduced, and some of us used them. It went on for a time, and a disciple from a western town introduced a wooden mallet. Well, the majority of us commenced using the mallet, and we thought that worked splendidly. This same gentleman then introduced a lead mallet which he conceived to be better, and stated the reasons, which were very good indeed. We all got to using the lead mallet; and here in New York, to-day, the majority of the dentists I think, I may say, work by hand-pressure and the lead mallet. How is it in Boston? They formerly used hand-pressure there; somebody introduced the spring mallet, and now most of the dentists are using the automatic mallet and hand-pressure. Take a trip to Philadelphia, and what are they doing there? They are not using the automatic or the lead mallet; they are using the electric mallet. A gentleman introduced one several years ago, and they are all using them. There is merit in all of these appliances. The question comes up, What is the best method of introducing or consolidating gold? Before I could answer that question, I would like to see the cavity I am to fill. If I am filling a cavity where I can get direct pressure, I would prefer a mallet and nothing else. I am sorry I was not able to attend the clinic this afternoon. I would have been very much gratified by the operation of Dr. Weld; and it seems to me that the operation, as described to me, is the best method of packing gold. I am told the cavity was very large. He first commenced by introducing soft foil by hand-pressure, packing the gold firmly against the walls of the cavity, and then continuing by the use of a hand mallet, and finally finishing with cohesive gold. It seems to me that he adopted the best method for that form of cavity. So far as the electric mallet is concerned, it does excellent work, but it is a slow machine. Gold must be used in small pieces, and it takes a long time to pack a filling, although in many cases it works admirably.

Dr. Perry. Will Dr. Francis say how he likes it? Let us have the patient's view. Is it pleasant?

Dr. Francis. Not so pleasant as the heavy mallet. The lead mallet is much less unpleasant than any other kind. I have tried the different varieties, including the electric mallet, the automatic mallet, and the lead mallet; and I have, in the same mouth, used mallets of block-tin, wood, steel, and lead, and intelligent patients have always given preference to the lead mallet.

Dr. Perry. Will Dr. Weld be more definite in regard to soft foil? Will he tell us what it is? Will he describe more fully his method of using it? Is it slightly cohesive?

Dr. Weld. It is not cohesive at all. I have tried S. S. White's foil, and found it very good. I use Dunning's points, and, perhaps, I operate as Dr. Dunning would in all cavities where the walls are sound. In reference to this question of soft foil, I have in my mouth four cavities that were filled with soft foil ten or twelve years ago. The gold was introduced in those four cavities and finished in forty minutes. They are as good teeth as are in my mouth. I have had gold introduced by mallet on the grinding surface of an inferior molar, and I have had decay around that. If there are any gentlemen here who can fill four proximate cavities, central incisor and lateral, in forty minutes, and have them last ten or twelve years, I should like to see the operation, and see the teeth at the end of that time.

Dr. J. Allen. I don't wish to speak against the mallet, for I contend that, aside from hand-pressure, the mallet is the best instrument that we can use.

Dr. Atkinson. I am pained to hear such inanity, and such a muddling of terms meaning the same thing. What do we mean by packing gold, is the question before us. It means the pressing of gold together. You annihilate the space between the particles of gold, and you have packed that gold, if it is pure, whether non-cohesive or cohesive. It is simply the difference of whether the gold is in condition to be readily adapted, and it makes no difference whether it is cohesive or non-cohesive. What difference is it what special method is resorted to to get impact, if we but get it? I pity the mechanical conception of any man who can say that he can with greater precision use his fingers in insuring a certain amount of impact that is sent through the machinery of a system that is elastic all the way through (even the bones are elastic). It is utterly impossible to do it accurately. Any kind of mallet, with a given amount of force, gives an impact that is definite every time, and all mechanics know that. They say that we are mechanics. God help our mechanism if that is the kind of mechanics we are! If you want precision use that kind of impact that is exact and accurate. This idea of filling a cavity and leaving the edges crumbling, that would have been nonsense twenty years ago; and to talk about filling a cavity before it is prepared,—away with it! It is an offense to any man who knows what saving teeth is. Who would dare do that thing? Prepare your cavities before you fill!

Dr. J. Allen. How would you prepare them?

Dr. Atkinson. Prepare with oxychloride of zinc and leave them four weeks, and they will come back all right. What I want to hit specially in the face is the impudence that sets itself up for intelligence, saying that this hand-pressure, with a spring instrument, can do more than with an instrument that is so stiff that it cannot spring. Men who are worthy of a better apprehension will advocate it to the extreme; but if you watch them when they practice, you will find that they pick out the stiff instrument and they drive it in as I have seen other men do, literally crowd it in. When we wish to pack gold we want to pack it solidly where it needs to be solid, and this idea of cohesive and non-cohesive is hardly worth the time it takes to talk about it. Since we have had the oxychloride of zinc and other preparations we need not be afraid that pulps will die of thermal changes and all that. In packing gold, when you have expended the energy that is brought to bear upon the instrument, so that the gold is as solid as the tooth substance is, until that time the patient don't know anything about it. The moment that there is a little excess of energy, over and above that which is necessary to pack the gold, that excess is felt by the patient.

Dr. Clowes. I thought that I should hardly say anything to-night, but I want to keep my hand in, and Dr. Atkinson has made one remark that I like very well. In speaking of osteo-plastic he agrees with me exactly in one respect. There may be no one here present that heard it at the time we had something to say on that subject. I stated, in the American Dental Association, at Philadelphia, that the most perfect gold filling in the world for a large crown cavity would be two-thirds of the cavity filled with osteoplastic and the remainder with gold. That is the most perfect gold filling in the world. There is no disputing it; or, if you do dispute it, you can't make out that it is otherwise than correct. In that way you have no vacant space anywhere. You have no large mass of gold to convey thermal changes. A case in practice to-day: A lady, for whom I had operated a year ago, among other fillings had a large gold filling put in by a very celebrated operator in this city. It was a proximate cavity in the first bicuspid, upper jaw. He had filled it very nicely, but did not understand the importance of being careful, of being humane, though that filling was a good one, so far as relates to packing and finishing. So I left it, and she tells me that nearly through the whole year she has been suffering from that tooth. She says, "I cannot drink any cold water without a shock. What do you suppose is the matter?" Said I, "That is easily told; that gold has been packed in there so firmly and so near the nerve that it is pressing upon the nerve or that portion of dentine between the nerve and the filling. When the shock comes it is produced by cold acting upon the dentine already inflamed by the pressure of the gold filling." Said she, "This very day that thing occurred. What are you going to do about it?" "Well," I said, "we will remove the filling." I removed the filling, because I knew the nerve was nearly bare. Immediately after the filling was removed I touched the cervical portion, but there was not a bit of feeling; but before I removed the filling she would jump. There was an improvement right away! There was some little softening. I then filled it with osteo-plastic, mixed with creasote, one (1) part to (4) four parts of chloride of zinc. I filled probably a third of the cavity with that. Then I excavated, so as to get a good foundation, and filled it with amalgam. She was about as happy a person as could be. She could take water and have no pain at all. She had been suffering a whole year. A good amalgam filling is as good a filling as there is,—as good as the best gold filling; and the gold is as good as that. There is another advantage besides the reducing of the shock: When filled with osteo-plastic you preserve the color of the tooth. No one knows that it is filled with anything. I worked twenty-five years with non-adhesive gold, and scarcely ever got one to please me as I now do with adhesive gold. And then I think of that blessed discovery of the adhesive quality of gold. It was with his hand (Dr. Atkinson's) that I saw the first adhesive gold applied, and it was so wonderful to think that two pieces of gold could be pressed together and become a solid mass that I looked upon it with awe; almost with adoration. I was in his presence daily for nearly a year before I dared touch it. I hardly dared to touch it during all that time.

Why should I go back? Why should I progress backward? What are the gentlemen talking about when they go back to non-adhesive gold? I would no more think of it than I would think of doing anything desperate. I thank God that it was discovered in my lifetime. The mallet has now no part in my office; yet I have used the mallet. It may be thought that I did not use the right kind of mallet. I got as far as the wooden mallet; but it was a very singular thing that when I filled a very large cavity, somehow those teeth would be brought back in the patient's hand. "Here is the tooth you filled for me." Why is this? What a pity! But so it was. I fill that kind of teeth now by hand-pressure, and they don't break then—they stand! It may have been no fault of the mallet at all, but somehow that thing happened. There are perhaps improved ways used now that make them strong. If a large cavity, we take a screw and fasten it into the root by means of osteoplastic, and put on the most perfect gold filling in the world again. That is my method.

Dr. Atkinson. If I had but one thing to say to the young men above all others, it would be never to fill a large cavity with gold altogether. I have a very marked case in my mind of a lady, who is of a very nervous temperament, and who had a very excellent operator work for her on the left inferior second and third molars, and no non-conductor being put in, they have annoyed her all the time since. I have filled the teeth on the other side, and covered them over with gold, and she asked me why they did not ache. I explained to her why they did not, and told her the others would ache until they had adapted themselves to circumstances, and deposited enough secondary dentine to ward off the shock. If you bear that in mind, I consider it valuable information for you. If I had possessed this knowledge earlier, it would have saved myself and my patients much discomfort.

Dr. Perry. How long have you used oxychloride?

Dr. Atkinson. Since about 1867; since I began to get it in good shape.

Dr. Hoyt. In case the dental pulp is exposed, and you use oxychloride, would you have irritation?

Dr. Atkinson. If you put on creasote, after the manner described in my paper published in the COSMOS, and take the excess of creasote away, and apply a cream of the oxychloride of zinc, then you will never have irritation of the pulp.

Dr. Hoyt. In the case of a large cavity, where the nerve is not exposed, I can understand the propriety of your creasote.

Dr. Atkinson. If you dry off the surplus creasote by bibulous paper, I think you will have no difficulty.

Adjourned.

ALUMNI ASSOCIATION OF THE PHILADELPHIA DENTAL COLLEGE.

THE annual meeting of the Alumni Association of the Philadelphia Dental College was held at the college building, February 27th, 1878, Dr. Alonzo Boice, president, in the chair.

The following officers were elected for 1878–79:

President.—Dr. M. H. Cryer, Salem, Ohio.

First Vice-President.—Dr. J. R. C. Ward, Philadelphia, Pa.
Second Vice-President.—Dr. José Pio Alves, Brazil.
Third Vice-President.—Dr. M. S. Mathers, Canton, Ohio.
Treasurer.—Dr. William A. Breen, Philadelphia, Pa.
Secretary.—Dr. Daniel Neall McQuillen, Philadelphia, Pa.

The graduates of the Philadelphia Dental College are requested to send their address in full (post-office, county, and State) to the undersigned.

Dr. Daniel Neall McQuillen,
Secretary Alumni Association,
108 North Tenth St., Philadelphia.

PENNSYLVANIA STATE DENTAL SOCIETY.

The tenth annual meeting of this society will convene at the Springs Hotel, Bedford, Pa., Tuesday, July 30th, at 10 o'clock A.M.

The subjects for essays and discussions will be published hereafter.

Dentists having cases suitable for surgical clinics will please inform the executive committee at once. Persons having improvements or inventions of interest to the profession will please notify the committee, who will make proper arrangements to have them exhibited. The hotel rates, to persons attending the society, have been reduced to two dollars per day.

G. W. Klump,
Chairman Executive Committee.

Williamsport, Pa.

BALTIMORE COLLEGE OF DENTAL SURGERY.

The thirty-eighth annual commencement of the Baltimore College of Dental Surgery was held in the Academy of Music, Tuesday evening, March 5th, 1878.

An address was delivered by James Williams Tucker, of the graduating class; the valedictory by Rev. Julius E. Grammer, D.D.

The number of matriculates for the session was forty-two.

The degree of D.D.S. was conferred on the following members of the graduating class by Professor F. J. S. Gorgas, Dean:

NAME.	RESIDENCE.	THESIS.
José Dolores Amieva, Jr.	West Indies	Mercurial Stomatitis.
George Edward Baughman	Maryland	Digestion.
Friedrich Moritz Brandt	Germany	Leptothrix Buccalis.
James Thomas Calvert	South Carolina	The Dental Pulp.
Elvira Castner	Germany	Second Dentition.
Adolfine Petersen	Germany	First Dentition.
William P. Crickenberger	Virginia	Respiration.
Charles Simon Hoffman	Maryland	Caries of the Teeth.
Charles Seymour Kelley	Montana Ter.	Dental Caries.
Joseph Cicero King	Tennessee	Mastication.
John William Daniel Maier	Maryland	Diseases of the Gums.

Alexander Carson McCurdy	Pennsylvania	Dislocation of Inferior Maxillary.
Granville Eustace Medley	Kentucky	Circulation of the Blood.
William Henry Richards	Tennessee	Nitrous Oxide Gas.
James Williams Tucker	Virginia	Filling Teeth.
Robert Bentley Varden	Maryland	The Blood.
John Nathan Webster	Virginia	The Ideal Dentist.

PENNSYLVANIA COLLEGE OF DENTAL SURGERY.

The twenty-second annual commencement of the Pennsylvania College of Dental Surgery was held at the Academy of Music, Philadelphia, Thursday evening, February 28th, 1878.

The address to the graduates was delivered by Professor James Tyson, M.D.; the valedictory by R. H. L. Naylor, D.D.S.

The number of matriculates for the session was one hundred and fifty-seven.

The degree of D.D.S. was conferred on the following graduates:

NAME.	RESIDENCE.
Nicholas M. Armingol	Cuba.
E. H. Angle	Pa.
Jno. Borden, Jr	Pa.
Geo. W. Bowman	Pa.
Jno. A. Bear	Pa.
W. C. Brewster	Pa.
C. H. Boyer	Pa.
William H. Buckingham	N. J.
A. McE. Cotton	Pa.
Jno. A. Carpenter	Mass.
Jno. J. Cobaugh	Ohio.
David L. Coe	N. Y.
J. K. Carskaddon	Pa.
Juan P. Dorticos	Cuba.
Wm. H. Dressor	N. Y.
S. E. Davenport	Mass.
William H. Dobbins	N. J.
E. B. Dillingham	Minn.
William Diehl	Pa.
Ferdinand A. Ewer	S. A.
David Genese	England.
J. D. Geissinger	Pa.
Cephas C. Gleason	N. J.
J. C. Greer	Ga.
J. L. R. Heichhold	Pa.
William F. Hermann	Mo.
Hermann Heller	Germany.
R. Hollenback	Pa.
E. B. Hoskins	N. H.
W. B. Henwood	Pa.
A. M. Hill	S. C.
Horace A. Hubbard	Ohio.
Thomas Ingham	France.
Roberto Jimenez	C. A.
Edward C. Kirk	Pa.
H. H. Knapp	N. Y.
C. V. Kratzer	Pa.
William H. Kilmer	Pa.
Henry De Lara	Cuba.
E. J. McCormick	Pa.
L. De L. Moss	Pa.
William S. Murray	Ind.
L. B. DeMorat	N. Y.
R. H. L. Naylor	N. J.
James J. Nelson	Pa.
Joseph C. Nelson	Pa.
Leopold Neumann	Germany.
Edmund Pourtier	Canada.
James K. Pattison	Ind.
Herbert Poate	England.
A. Retter	Conn.
Rafael de J. Rubio	Cuba.
Reed J. Rex	Ohio.
Clate. J. Reynolds	Pa.
James H. Ringland	Pa.
Jno. J. Ryan	Canada.
A. Reynolds, Jr	Ga.
Herbert F. Seip	Pa.
J. H. Sherwood	Ohio.
Moung Pho Sanwin	India.
H. M. Sheppard	N. J.
M. Welsh Strealy	Pa.
E. L. Townsend	Minn.
C. J. Tibbets	Ill.
William H. Taylor	Pa.
J. A. Todd	N. Y.
Ricardo Ruiz de Ugarrio	Cuba.
J. Robb Vandevere	Pa.
Diego Lopez Vila	S. A.
C. K. Van Vleck	N. Y.
W. G. Wallace	Cal.
David T. Way	Pa.
W. B. Woodward	Ill.
J. Bond Watt	Pa.
William Wildman	Pa.
Frank Woodbury	N. Y.
J. S. Waugaman	Pa.
Rees Williams	Pa.

PHILADELPHIA DENTAL COLLEGE.

The fifteenth annual commencement of the Philadelphia Dental College was held at the Academy of Music, Philadelphia, Wednesday evening, February 27th, 1878.

The address to the graduates was delivered by Professor J. H. McQuillen, M.D.; the valedictory by W. E. Royce, D.D.S.

Number of matriculates for the session, one hundred and eighteen.

The degree of D.D.S. was conferred on the following graduates:

NAME.	RESIDENCE.	THESIS.
José Pio. Alves	Brazil	Salivary Calculus.
Ambrose J. Avery	Georgia	Digestion.
Samuel B. Barfield	Georgia	Materials for and Mode of Filling Teeth.
George Berger	Germany	Caries of the Teeth.
Frederick H. Berner	Switzerland	Continuous Gum.
Fabio Berasain	Bolivia	Continuous Gum.
Charles Bolens	Switzerland	Alveolar Abscess.
Oscar Booth	New Hampshire	The Dental Pulp.
George A. Colomb	Louisiana	Treatment of the Mouth for the Reception of a Denture.
C. Bunting Colson	South Carolina	Advantages of Lime to Teeth.
John J. Coxeter	Massachusetts	The Teeth of Man.
Frank Eyre, M.D	Pennsylvania	Saliva.
Walter H. Fundenberg	Pennsylvania	Conservative Treatment of the Pulp.
Edwin C. Fundenberg	Pennsylvania	The Organs of Circulation.
Arthur R. Gage	New York	Conservative Treatment of the Pulp.
Frank D. Gardiner	Rhode Island	Soft or Non-cohesive Foil.
L. Wesley German	Pennsylvania.	Alveolar Abscess.
P. Videau Guerry	Georgia	Continuous Gum.
Jesse Godley	New Jersey	Dental Therapeutics.
James T. Hervey	Kentucky	Innervation.
Louis Hoffstadt, Jr	Pennsylvania	Mechanical Dentistry.
James Lawrence	Cuba	Digestion.
Marshall G. Little	Georgia	Construction of Continuous Gum.
George B. Lyon	Iowa	Development of the Teeth.
G. M. McMillan	Ohio	Comparative Anatomy of the Heart.
Robert L. Mearns	Queensland, Australia	Advantages of Scientific Training for the Dental Profession.
John H. E. Milhous	South Carolina	Treatment of Exposed Pulps and Dead Teeth.
George B. Newland	Argentine Republic	Sensitive Dentine.
I. Franz Patloch	Austria	Expression of the Mouth.
Hermann E. Pflüger	Prussia	Irregularity of the Teeth.
John R. Putnam	Maine	Dental Pathology.
Hugo Rettich	New York	Salivary Calculus.
Robert Richter	Prussia	The Human Teeth.
Edward A. Royce	New York	Dental Æsthetics.
Waldo E. Royce	Wisconsin	Treatment of Deciduous Teeth.
Fowler K. Ruff, M.D	South Carolina	Anæsthetics.
Henri L. Schaffner	Switzerland	Gold Plates.
George H. Scott	Pennsylvania	Operative Dentistry.
Henry G. Sperber	Prussia	Preservation of the Teeth.
José C. P. Silva	Brazil	Nitrous Oxide Gas.
W. H. Taggart	Illinois	Dental Hygiene.

NEW YORK COLLEGE OF DENTISTRY.

The twelfth annual commencement of the New York College of Dentistry was held at Chickering Hall, Tuesday evening, February 26th, 1878.

The address to the graduates was delivered by Rev. F. Courtney; the valedictory by George Hammond, D.D.S., of the graduating class.

The number of matriculates for the session was ninety-two.

The degree of D.D.S. was conferred by Dr. William H. Allen, President of the Board of Trustees, upon the following: the theses consisting of written answers to questions by the Faculty.

NAME.	RESIDENCE.	NAME.	RESIDENCE.
Eladio Aquilera	Mexico.	Alfred P. Goodell	N. Y.
James M. Beale	N. Y.	George Hammond	N. J.
Salo. Behrendt	Germany.	Charles E. Kells, Jr	La.
James H. Farnsworth	Mich.	Cornelius Kiel, Jr	N. J.
Gilbert W. Goldsmith	Cal.	Julius M. Stebbins	N. Y.
Emilio Yglesias	Porto Rico.		

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BOSTON DENTAL COLLEGE.

The tenth annual commencement of the Boston Dental College was held at Fraternity Hall, Wednesday evening, March 6th, 1878.

Essays were read by Edwin Willis Andrews and Francis Edward Macomber.

The valedictory was delivered by William Frederick Giddings, D.D.S., and an address by Professor Charles H. Spring.

The number of matriculates for the session was twenty-five.

The degree of D.D.S. was conferred on the following graduates by Professor Isaac J. Wetherbee, President:

NAME.	RESIDENCE.	THESIS.
Edwin W. Andrews	Massachusetts	Indication for the Extraction of Teeth.
John S. Bagnall	Prince Edward's Isl'd.	Anæsthetics.
Clarence H. Bowers*	Massachusetts	Loss and Restoration of the Natural Expression of the Face.
Edward N. Francis*	Massachusetts	Surgical Diseases.
Charles H. Keach	Massachusetts	Teeth and their Conservation.
Wm. F. Giddings	Maine	The Circulation.
John Lauder, L.D.S.	Province of Quebec.	Preparation of the Mouth for Artificial Dentures.
Francis E. Macomber*	Massachusetts	Microscopical Development of the Teeth.
George H. Peirce	Massachusetts	The Development of the Teeth.
Fred. F. Roby	New Hampshire	Odontolithos.
John M. Smith	New Brunswick	Treatment of Dental Caries and Alveolar Abscess.
Edward W. White	New Hampshire	Dentistry a Specialty.

* Diploma conferred when all conditions are fulfilled.

MARYLAND DENTAL COLLEGE.

The fifth annual commencement of the Maryland Dental College was held in the Academy of Music, Baltimore, Thursday evening, March 7th, 1878.

The address to the class was delivered by Col. Charles Marshall; the valedictory by V. H. Reisinger.

The degree of D.D.S. was conferred upon the following graduates:

Name.	Residence.	Name.	Residence.
J. C. Caroli	Conn.	A. S. Moore	Ga.
D. C. Green	Md.	V. H. Reisinger	Ohio.
C. D. Hayward	N. Y.	H. M. Schooley	D. C.
E. W. Howells	L. I.	J. Curtiss Smithe	D. C.
Chas. Lanaux	La.	H. A. Steber	N. Y.

BIBLIOGRAPHICAL.

The Dental and Oral Science Magazine. Devoted to Professional Interests and the Transactions of the New York Odontological Society. Edited by James E. Dexter. Published Quarterly by R. S. Williams, New York. Terms, $2.00 a year, in advance.

The first number of this new enterprise is before us, and presents a very creditable appearance. The publisher announces it as the only method of publication which the New York Odontological Society now uses. It is to present their full and unabridged proceedings. Its readers are therefore promised material of much more than ordinary scientific and professional value; in fact, the thoughts, theories, and results of some of the very best minds in modern dentistry.

OBITUARY.

DR. PRESCOTT E. WHITE.

Died, in Brooklyn, N. Y., February 2d, 1878, Dr. Prescott E. White, aged thirty-two years.

At a meeting of the Brooklyn Dental Society, held February 11th, 1878, the following resolution was unanimously adopted, accompanying an appropriate preamble and resolution of condolence:

Resolved, That, although Dr. White had been with us but a comparatively short time, he had endeared himself to us, and we had come to regard him as a talented and progressive member of our profession.

C. P. Crandell, *Recording Secretary.*

THE LATE PROFESSOR BARKER.

At a meeting of the Chicago Dental Society, held March 4th, 1878, the following resolution was passed:

Whereas, Death has taken Professor George T. Barker, a well-known and eminent teacher in our profession, from his career of usefulness on earth; therefore,

Resolved, That we, the Chicago Dental Society, deeply sympathize with the faculty of the dental institution with which he was so honorably connected, and that we sincerely condole with the members of his afflicted family and the large circle of friends who mourn his untimely loss.

M. S. Dean, *Cor. Sec.*

DR. WILLIAM B. DENNIS.

The committee appointed by the American Academy of Dental Science, at a meeting held at the house of Dr. Preston, Mt. Vernon Street, Boston, November 7th, 1877, to present resolutions of respect to the memory of Dr. William B. Dennis, deceased, late a member of this academy, respectfully beg leave to report the following:

Resolved, That in the death of Dr. Dennis, this academy has lost a valued member, whom his associate-fellows have respected as a faithful worker in our profession, and whose integrity and honesty of purpose have been manifest to all that knew him.

Resolved, That, while we extend to his family our expressions of sympathy in their deep affliction, we most sadly feel how inadequately we can express the sense of bereavement to those who have lost a devoted husband, a loving father, and a dutiful son.

Resolved, That the secretary be directed to send a copy of these resolutions to the family of the deceased, and to cause them to be published in the dental journals.

Frederick N. Seabury,
Henry F. Bishop, } *Committee.*
George T. Moffatt,

HINTS AND QUERIES.

"He that questioneth much shall learn much."—Bacon.

Correspondents desiring a reply in this department are requested to make use of *distinctive signatures or initials*, and avoid the practice of signing their communications Reader, Subscriber, etc.

Correspondents who wish notice to be taken of their communications should authenticate them with their names. We cannot insert queries or replies except they are so accompanied. Names not necessarily for publication.

Owing to a press of matter, several pages of Hints and Queries already in type have been unavoidably laid over.—Editor Dental Cosmos.

A Dental Department of the University of Pennsylvania Organized.—Since the previous forms of the Dental Cosmos went to press, the following announcement has appeared in the *Public Ledger* of this city. The vacancies occurring in the Pennsylvania College of Dental Surgery have been promptly filled by the trustees. The new organization of the latter institution appears in our advertising pages. The university plan will be noticed more fully hereafter. —EDITOR DENTAL COSMOS.

"The trustees of the University of Pennsylvania, consistent with the plan of reformed and extended teaching inaugurated a year ago, have instituted a Dental Department, to be opened at once. The Professors will consist of the Professors of the Medical Department occupying the chairs of Anatomy, Physiology, Chemistry, Materia Medica, and General Pathology and Morbid Anatomy, together with two additional Professors—one of Operative Dentistry and Dental Histology, and a second of Mechanical Dentistry and Metallurgy, with a full corps of competent demonstrators. Dr. Edwin T. Darby and Dr. Charles J. Essig have been elected to the new Professorships by the trustees.

"The trustees of the University will immediately erect on their property in West Philadelphia and fronting on Spruce Street, at the corner of Thirty-sixth, an elegant and commodious building, designed to accommodate the Dental Department and to provide the additional laboratory facilities demanded by the success of the new graded course of instruction adopted a year ago.

"The matriculation book of the new Dental Department will be opened at the office of the secretary of the new faculty, Dr. Charles J. Essig, northeast corner of Sixteenth and Locust streets, where students may matriculate at once."

DOES it ever happen that teeth burst? If so, what is the cause? A gentleman related a circumstance to me of one of his molar teeth bursting into three pieces after a protracted spell of aching.—W. C. ALLEN.

CAN a tooth retain any of its vitality after the extirpation of its pulp? If so, from what source and in what manner does it derive such vitality? also, is it possible for such a tooth to derive vitality and nourishment from the alveolar periosteum or other surrounding tissue?—D. W. B.

IN reply to I. L. F., who asks if a tooth can retain its vitality after the formation of an abscess, allow me to say that an abscess does not necessarily imply death; indeed, the formation of pus is the result of a vital action,—the word abscess signifying to go from or separate itself from the rest of the body, a tumor, or swelling containing pus. An abscess may exist within a tooth while the nerves and their accompanying vessels in the one, two, or three roots, as the case may be, are all in a vital though pathological condition.

The body or mass of pulp-structure situated in the base of the crown may have passed from simple congestion through the various progressive inflammatory stages until the suppurative process is reached, then, if there is a means of exit through the crown for the accumulating pus, the tissue in the roots, if not subjected to further injury, may retain its vitality for an almost indefinite period; but, without this external opening, the pus must seek some other means of escape. Following the law governing all such accumulations, it advances in that direction from which the least resistance is offered; hence through the root and out at the apical foramen is its inevitable tendency. If this occurs in a single-rooted tooth, then we have loss of vitality or partial necrosis to the extent embraced in devitalization and destruction of the pulp-structure, with an abscess and invariable fistula at or near the apex of the root involved.

If the tooth has two, three, or four roots, it is not essential that the tissue in more than one of these be destroyed,—that one being the root through which the pus can be most readily discharged, while the others retain their vitality for months in a sufficiently normal degree to give considerable pain when probed, and more or less nourishment to the dependent structures.

The inflamed and subsequently devitalized pulp within the tooth is not the only source from which an abscess may originate. The periosteum, or peridental membrane more specifically called, is equally liable to inflammation and its concomitant results. The formation of pus from this tissue is of frequent occurrence, while its discharge is generally around the neck of the tooth, though occasionally through a fistula in the gum, and this condition may exist for months and even years without effecting loss of vitality in more than a very limited portion of the membrane involved, and, if it does not extend to the covering of the apical foramen, the normal condition of the nerve and its accompanying vessels within the roots will probably not be disturbed. This brings us to a direct answer of the inquiry, Can a tooth retain its vitality after the formation of an abscess? If a single-rooted tooth has an abscess established around its apex and a fistula through which the pus is being discharged closely approximating, *it is partially necrosed*, the death of a large portion of the dentine of the tooth following as a sequence to the loss of vitality of the pulp.

If the tooth causing the abscess has two or more roots, the nerve is only necessarily dead in such as have the abscess around the apex while the pulp-tissue in the other root or roots is in a pathological condition, to be followed probably, though not necessarily, in the course of a few months, by death and disintegration. If the abscess proceeds from the peridental membrane, the process of necrosis in the cementum of the tooth is remarkably slow, the abscess continuing for years without more than a very limited portion of the outside of the root becoming necrosed. Now, one word of caution before condemning a tooth which has no other evidence of devitalized pulp than a fistula located near the apex of its root. It not unfrequently occurs that a small portion of bone or alveolar process becomes necrosed, and from the tissue surrounding we have the formation of pus, finding an exit at times some distance from the seat of disease. With a small flexible probe this can readily be detected, so a word to the observing practitioner is all that will be necessary to prevent a mortifying error. —C. N. P.

Reply to J. N. H., of California.—You were mistaken in addressing your communication in the February Dental Cosmos to S. R. D. You doubtless meant Dens. If you refer to the Dental Cosmos for November last, you will see that I am not favorable to heavy plates, therefore could not have recommended them. My theory is, to make a plate that will fit the ridge; make it air-tight; give it the proper width; arrange the teeth so that they will antagonize well, and they must succeed on a fair trial.—S. R. Dieffenbacher, *Butler*, *Pa.*

Salicylic Acid.—Formerly this acid was very bitter to the taste, and also very insoluble in alcohol. Owing to a difference in the mode of manufacture, it is now *not* bitter, and is also very soluble in alcohol, one ounce of the latter dissolving about three hundred grains of the acid; and all this without injury to its curative and antiseptic qualities. It has been reported injurious to the bones and teeth, and I find many dentists *think* it has the power of dissolving enamel. They can soon satisfy themselves that it will *not* dissolve enamel or unite with it in the least. I placed a sound tooth in the strongest solution of the acid for forty-eight hours, and on examination there was not the least appearance of corrosion. Being without smell or taste, its good antiseptic qualities recommend it in the "treatment" of teeth.—HENRY S. CHASE, *St. Louis, Mo.*

REPLIES TO QUERISTS IN FEBRUARY DENTAL COSMOS.—P. E. W.—I presume the pulp was still alive, though I have seen sensitive dentine in a tooth where the pulp-cavity was filled with gold.

M. P —I have had hundreds of cases, which I have easily cured as follows: wiping *perfectly dry* the affected parts and rubbing the dentes with a soft wood stick, the end of which I continue to dip in creasote. The oral fluids are to be kept away during the operation, and the rubbing continued for several minutes, and repeated every other day for a week.

J. B. W.—In thirty-five years' practice I have never hesitated to extract a tooth for a pregnant woman, and have never seen any unpleasant results.

H. C. H.—The canals should have been syringed with warm water, then dried as thoroughly as possible; then sopped with alcohol to cleanse and disinfect; dried again; then filled with a solution as follows: salicylic acid, eighty grains; gum-shellac, six drachms; alcohol, one ounce. The cavity of decay should be solidly filled with cotton moistened in the same solution. In a week's time the cavity may be permanently filled. The solution, by the evaporation of the alcohol, becomes solid in the roots. No dead tooth should be filled without previous treatment —HENRY S. CHASE.

A CARD.—TO THE EDITOR OF THE DENTAL COSMOS: In an advertisement in the Ithaca, New York, *Daily Journal* of January 30th ult., certificates from a number of dentists in different places in the State of New York are published, in which they are placed in the attitude of disapproval of continuous-gum work. A decent regard for the common courtesies of professional life compels us, whose names were thus used, to the following statement:

About the period named each of us received a letter from Dr. F. S. Howe, of Ithaca, asking if continuous gum was made in our locality. Each answered that for various reasons it was not. Nearly all regretted that a want of proper appreciation on the part of the people did not warrant us in keeping up furnaces for its manufacture. Garbled extracts from these letters were published by Dr. Howe in the advertisement referred to, for the purpose of scoring a point against a competitor. There would seem to have been a strife between some of the Ithaca dentists as to which could outdo the other in strained advertisements, show-cases, exhibitions at county fairs, personal detraction, and other such gross unprofessional acts, and these letters of inquiry were delivered to us, who were in ignorance of the circumstances that one side might be braced up by our certificates thus surreptitiously obtained. With any private quarrel between Ithaca dentists we have, and desire to have, nothing whatever to do; but we wish to set ourselves right before our brother dentists, by thus publicly protesting against this unauthorized and unwarranted invasion of private correspondence, and to say that, so far from being of the opinion which the advertisement would seem to convey, we believe continuous-gum work to be the very highest expression of mechanical dentistry, though its successful working may require exceptional skill and constant practice.

W. C. BARRETT, *Buffalo.* G. W. TRIPP, *Auburn.*
FRANK B. DARBY, *Elmira.* R. N. HUDSON, *Auburn.*
S. H. MCCALL, *Binghamton.* S. G. MARTIN, *Syracuse.*
H. HODGE, *Binghamton.* R. WALKER, *Owego.*
PROCTOR & ALLEN, *Rochester.*

THE

DENTAL COSMOS.

VOL. XX. PHILADELPHIA, MAY, 1878. No. 5.

ORIGINAL COMMUNICATIONS.

NECROSIS.

BY C. F. W. BÖDECKER, D.D.S., M.D.S., NEW YORK.

(Read before the First District Dental Society of New York, March 5th, 1878.)

I PROPOSE to speak to you to-night of the case alluded to a few meetings since, namely, necrosis of the inferior maxilla. I will recapitulate its history.

On the 27th day of June, 1877, the patient, a married lady, thirty-eight years of age, a native of France, applied to me. Her temperament may be called bilio-nervous. The left eye protruded considerably from the orbit, the pupil was dilated to nearly twice the size of that of the right eye, and the patient was unable to use the other eye without shading or shutting the affected one. She complained of a bad taste in her mouth since July, 1874. Her gums had been swollen for two days, in the region of the first and second molars of the lower jaw, on the left side. On the 6th of July, 1874, she had consulted an eminent oculist of this city, who (she says) told her that the protrusion and partial blindness of the left eye was due to paralysis of the optic nerve. He applied electricity, and gave medicines internally, but without beneficial result.

While under treatment a severe neuralgia developed, which involved the whole of the left side of the body, and continued with greater or less severity up to the time she consulted me. After the development of the neuralgia she had consulted further with a number of eminent general practitioners, but without gaining relief from the pain, bad taste, or disfigurement.

I made a careful examination of her mouth, and found the first lower molar necrosed and loose. I advised the immediate removal of the tooth, which was assented to by the patient. I then dismissed the patient with the request that she would see me again.

Fifteen days after, on the 12th of July, the patient returned, and, on further examination, I was convinced that this was a case of necrosis. I made an injection of aromatic sulphuric acid into the socket, and informed the patient that the bone would have to be removed; that I believed the whole trouble originated there, and that perhaps, when it was taken out, she would be entirely relieved. The patient, greatly frightened, went to one of her physicians, who did not seem to understand the case, but took her to a professor of this city, and both denied the correctness of my diagnosis. The professor said he believed there was a tumor forming, and that which the dentist supposed was necrosis was nothing but a root of a tooth, which should be extracted.

A few days after this the patient returned to me with a letter from the doctor, requesting the extraction of the root. I was surprised to receive such an opinion from such an authority. I reasserted my former diagnosis to the lady, and told her that both physicians had mistaken the dead socket, from which the tooth had been removed, for a root.

For the satisfaction of the patient and myself, I invited her to see Dr. W. H. Atkinson, who, after examination, pronounced it to be an unmistakable case of necrosis, and advised a continuation of the aromatic sulphuric acid treatment every other day. For the removal of the *débris*, I advised the patient to use permanganate of potash, ten grains to an ounce of distilled water, taking a few drops of this in half a glass of water, and rinsing the mouth with it as often as necessary.

After the ninth application of the acid I found a pretty large piece of bone loosening. I enucleated the yet attached periosteum and gum, and removed a sequestrum (measuring about one inch and a quarter in length) from the second molar to the first bicuspid tooth,—almost the whole mass, in thickness and depth, of the lower jaw,—leaving only the lower and outer border, and a very thin connection between the angle and symphysis, and involving the inferior dental canal, in which no living nerve nor vessel was present. I then rinsed the pocket with a solution of a teaspoonful of salt to half a pint of water, subsequently drying it with cotton, and again applying the aromatic sulphuric acid, and stuffing the pocket rather tightly with cotton.

The next day the patient was in excellent spirits; able to see with her left eye, and rid of the neuralgia, as well as of the bad taste. I dressed with wine of opium, using the aromatic sulphuric acid every third to fifth day, till the 14th of September. I then found, as I expected, the second and first bicuspids loose, and extracted them, continuing the alternate use of aromatic sulphuric acid and wine of opium.

On the 24th of September I drilled away nearly the whole bone, from the second bicuspid to the canine tooth, leaving only enough to hold the jaw together. The part from which the first sequestrum had been removed was, by this time, almost filled by healthy granulations, and, on the whole outer side, had formed a sort of provisional callus, which enabled me to take away as much as I did without breaking the jaw. The patient, in this condition, was, of course, not able to eat anything but soft or liquid food. Continuing the dressing as before, small spiculæ of bone separated and came out with the cotton dressing, or were removed by the forceps.

On the 12th of November, the canine, and shortly after, on the 24th, the central and lateral incisor teeth of the same side became loose, and were removed. After this my patient became so weak and nervous that I was obliged to give up the acid treatment, only using the wine of opium daily, after thorough cleansing with salt water, requesting the patient to take plenty of out-door exercise during sunlight, to eat oysters, eggs, etc., drink wine or porter; in short to live on highly nutritive semi-solid food.

On the 15th of January, 1878, I removed the rest of the dead bone, extending from the canine tooth to the symphysis. This I accomplished, as before, with the large round bur of the engine, leaving but a thin plate of the body of the lower jaw, which I was sure was healthy. After this I made a few more applications of aromatic sulphuric acid and wine of opium, and to-day the patient is well. She has had no more neuralgia nor bad taste; can see with her left eye, though not as well as with the right one; but she is satisfied, and I am too.

How is it to be explained that such general disturbances arose from a piece of necrotic bone in the jaw? I think, in the following manner: By a reflex irritation of the inferior dental nerve upon the submaxillary and otic ganglia, which are in connection with the anterior branches of the superior cervical ganglion, and in direct connection with most of the cranial and some of the spinal nerves, the almost constant neuralgia, on the affected side, is easily explicable. The bad taste, I believe, had a double origin: first, directly from the necrotic point; secondly, from perverted action of the gustatory nerve, a branch of the inferior maxillary division of the fifth; lastly, as to the dilatation of the pupil, I think it resulted from paralysis of the iris and ciliary processes, the protrusion of the eyeball from a relaxation of the recti muscles brought on, I believe, by the irritation of the ciliary ganglion in connection with the third nerve (motor oculi), which supplies all the outer muscles of the eye, except external rectus and superior oblique, and the short ciliary nerves distributed to the ciliary muscles and iris.

Now as to the microscopical differences between normal and necrotic bone. The successful study of the elements of bone-tissue depends very much upon the method employed. The proper examination of bone-tissue originated in the second and third decade of this century, and was pursued by Howship, Havers, Henle, and others; all of whom resorted to dry bone, which they divided into thin slabs by the use of the saw, after which these were ground thin by a variety of devices, reducing each specimen to semi-transparency. Observations made in this way resulted in the theory of canaliculi bearing a solution of lime salts, hence the name "canaliculi calchofori." In 1850, Rudolph Virchow and F. C. Donders applied the cell doctrine of Schwann to the explanation of bone-tissue. They sometimes used dry and sometimes fresh bone in their investigations, macerating it in dilute hydrochloric acid, whereby they liberated the elements of the structure more or less distinctly. The bodies so isolated presented, sometimes, nucleated structures connected together by branches; at other times, completely isolated bodies consisting of a central mass with projecting processes, and to these they gave the name bone-cells. Donders, in 1853, drew attention to the fact that bone-tissue had spaces filled by cell-like structures similar to those of other kinds of connective tissue. E. Neumann, in 1863, asserted that the so-called bone-cells were not the cells designated by Schwann, but spaces with offshoots having a more densely calcified wall than the other basal substance, and thus better able to withstand the reaction of solvents. These bone-cells are no other than the lacunæ, and their offshoots the canaliculi. Virchow came to believe that the cells were inclosed within the lacunæ, though without filling the whole space, and to this day adheres to the cell doctrine of Schwann, and claims it to be the only possible explanation of the bone-cells being inclosed in the lacunæ and their offshoots, containing a fluid, and ascribing to them the property of life, forgetting that a fluid as such is not endowed with life.

Inasmuch as the dry method of examination of bone-tissue prevailed exclusively up to the introduction of the wet method, by Heinrich Müller, in 1856, it is not surprising that it is frequently persisted in to this day. The nearer to the living state the examinations can be made, the more instructive and definite will the observation be. Hence the dry method is fast falling into disuse among those making histological researches.

In 1871, Edward Lang introduced the examination of living bone under the microscope upon the heated stage, by which he noticed amœboid motion in bone-corpuscles. By this management the lacunæ were proved to contain protoplasm, but the nature of the contents of canaliculi he said nothing about. The method of examining bone-structure introduced by Heinrich Müller, viz., to decalcify bone by the use of a solution of chromic acid. is to be preferred. Fresh, living bone should be introduced into a solution of chromic acid of from a half to one per cent., to which may be added, to hasten the decalcification, on every second or third succeeding day, a few drops of dilute hydrochloric acid. The vessel should be emptied and the fluid renewed about every fifth day. In this way bones are decalcified in a short time, and without considerable change. For thin bones two to three weeks are sufficient to soften them enough to produce sections of any degree of thinness by the use of the razor. Such sections may be stained by placing them in a solution of chloride of gold, of one-half to one per cent. in strength. An examination of such preparations will show that, within the lacunæ of the bone, nucleated protoplasmic bodies are to be seen, with finely granular offshoots extending into the larger canaliculi, where they are lost to sight. From the surface of the protoplasmic body in the direction of the basis-substance many conical processes protrude towards the small canaliculi, with which they blend.

In 1873, C. Heitzmann described the net-like structure of protoplasm, and also observed the same arrangement in the protoplasmic bodies within the bone. He describes the net-like structure thus: "The nucleolus is connected with the wall of the nucleus, and this again with the granules by very fine threads, which are to be regarded as the living matter proper, while the fluid contained within these meshes does not possess the property of life."

One year before, namely, in 1872, this observer described and illustrated a bone-corpuscle from bone in the early stage of inflammation, in "Wiener Medicinische Jahrbücher," 1872, Plate IX. Fig. 3. This plate shows very plainly the shining, nearly homogeneous-looking bone-corpuscle, with offshoots in every direction, filling the whole caliber of the canaliculi. It solves the question of the contents of the canaliculi in bone, by direct observation. The living granular protoplasm in bone behaves precisely as in other tissues under the influence of the inflammatory process,—that is to say, the central mass becomes a shining and nearly homogeneous lump, the offshoots from which occupy the whole caliber of the canaliculi, and by this the analogy of bone to all other tissues is established. That is to say here, as elsewhere, the living part of the protoplasm forms a continuous net-work throughout the whole animal body, in the meshes of which a more or less fluid basis-substance is found, differing in its chemical properties in different situations, which in bone is glue-giving, and infiltrated with lime salts.

I have followed the methods, in my examination of bone-tissue, as above described. This enabled me, by the use of the razor, to obtain sections fit to be examined by an immersion-lens magnifying

800 to 1000 diameters. I noticed that the canaliculi could be plainly seen in sections, the basis-substance of which had retained a small quantity of lime salts; in completely decalcified specimens, they are very faintly discernible. According to my experience, it is better to stain the sections with a solution of chloride of gold of the half of one per cent., whereby a better view of both protoplasm and basis-substance is obtained. Another good way is to stain the sections with carmine and hæmatoxylin.

The results of my observations with high magnifying powers, 800–1000 diameters, are that bone-tissue presents faint parallel lines, dividing it into the so-called lamellæ, within which we find the bone-corpuscles, the shapes of which vary according to the direction of the cut and of the lamellæ. As bone-corpuscles are flattened lenticular bodies, we will recognize them in this shape in the front view only. Longitudinal sections through these bodies give a spindle-shaped outline, small when cut near the boundary, broad when cut through the middle line of the lentil. A cross-section through a bone-corpuscle shows a somewhat irregular body. A cross-section from the compact bone of a lower jaw presents invariably bone-corpuscles in all three varieties.

Fig. 1.

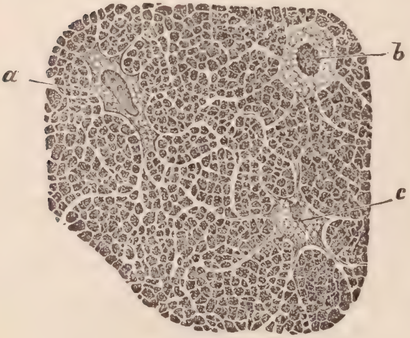


Figure 1 shows three bone-corpuscles from the lower jaw of a man about thirty years of age, who died of an aneurism. All three bone-corpuscles are drawn in the front view, as seen by an immersion-lens of T. Grunow's, of this city, magnifying, with the eye-piece, 1000 times. The basis-substance I have drawn a little darker than a chloride of gold or hæmatoxylin preparation would appear under the microscope, but it will give a clearer idea of the whole. In Figure 1 we see three large spaces, showing a number of ray-shaped offshoots. Besides these coarse offshoots, innumerable extremely fine light ones are present. The larger as well as the smaller all communicate with each other in this way, forming a delicate net-work through the whole of the basis-substance. Within the three lacunæ of Figure 1 are present protoplasmic bodies. We observe in the center of the protoplasmic bodies *a* and *b*,—a shining, oblong nucleus in *a*, and a round one in *b*, in which the nucleoli are not distinctly visible. Around the nuclei we see a narrow seam, traversed by numerous very fine threads, which are cone-shaped. Their bases are directed towards the nucleus, from the periphery of which they arise, while their points are in connection with the nearest granules of the protoplasm. Within the protoplasmic substance there are finer and coarser granules, all being connected with each other by very fine threads. The seam around the nucleus, as well as the spaces between the meshes of the threads, are observable, being much lighter than the latter.

From the periphery of the protoplasmic body numerous thick offshoots enter the larger canaliculi, which sometimes can be followed up until they communicate with the protoplasm of other large neighboring canaliculi. Besides these many very fine offshoots run from the periphery of the protoplasm contained in the larger canaliculi towards the basis-substance. Some of them can be seen to enter the fine canaliculi, but their course cannot be distinctly followed. Figure 1, *c*, shows a protoplasmic body without nucleus; probably this has been cut near to its periphery without touching the nucleus. C. Heitzmann states that the nucleus, the granules, and the threads represent the living matter which fills all the coarse canaliculi. My preparations show a much finer net-work within the basis-substance than C. Heitzmann's figure before alluded to. Though I am not able to distinctly demonstrate the presence of living matter in the finest canaliculi, yet, as we find it in all other kinds of connective tissue, I am justified in assuming it. In normal bone the lacunæ and canaliculi are not entirely filled by the living protoplasm. On the periphery of each protoplasmic body we see a distinct light seam, traversed by the offshoots, which, in a cross-section, only show the living part of the protoplasm in the center of the canaliculus, hence leaving sufficient space for the nutrient circulation.

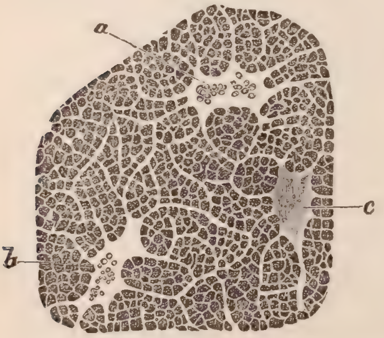
The minute changes of necrotic bone are very interesting, but it is impossible to study the differences between it and normal bone if the specimens be prepared from dry osseous tissue.

I have made microscopical examinations of necrotic bone from the lower jaw, in the foregoing case, and from another piece from an upper jaw removed by Dr. Frank Abbott. The methods employed were exactly the same as before described from normal bone. In both cases the necrotic sequestra, as soon as they had been taken from the mouth, were put into the solution of chromic acid, and cut in due time. As these pieces were small, I imbedded them in a mixture of paraffine and wax (after the extraction of the water by treatment with alcohol for twenty-four hours), whereby I was enabled to obtain extremely thin sections, some of which I stained with chloride of gold, some with hæmatoxylin, and some I mounted unstained.

The results of these examinations were as follows:

The outer surface of the necrotic bone, which, to the naked eye, looked rough and eaten out, when brought under the microscope showed bay-like excavations, known formerly as "Howship's lacunæ," in which there was visible a granular mass mixed with pus-corpuscles. In the middle of the bone I found all the Haversian canals more or less enlarged, some showing the bay-like excavations. The contents of the Haversian canals were everywhere the same,—a conglomerate mass of darkly-shaded granules, which I was unable to stain with carmine. These masses are the same that we see in decomposition of organic matter,—"micrococci." Here and there some medullary corpuscles and multinuclear protoplasmic bodies (myeloplaxes of Robin, giant-cells of Virchow) were recognizable. I did not see blood-vessels in any of the Haversian canals. In the necrotic bone I found the traces of former osteitis. The enlargement of the Haversian canals and lacunæ are direct proofs of this; the dissolving out of the basis-substance on the periphery may, on the contrary, have been due to chemical changes, produced by infiltrations from the neighboring inflamed tissues. Billroth has shown that if pieces of bone or ivory are driven into living bone, in which they excite inflammation, they will afterwards exhibit a peculiar dissolving out of basis-substance analogous to that which we see in the primary stage of inflammation. The Haversian systems and concentrical lamellæ were unchanged. The lacunæ and canaliculi were yet preserved. In the necrotic preparation from the lower jaw I observed many lacunæ, in which the protoplasmic body, with its living net-work, was yet distinguishable, especially where the sequestrum had been attached to the periosteum. I found also, in the preparation from the upper jaw, some comparatively unchanged bone-corpuscles. But the majority of the bone-corpuscles, and especially in the neighborhood of the Haversian canals, had the appearance of a Roman numeral II; they were either empty, or their protoplasmic bodies were shriveled up (probably the remains of the living matter), only showing a few coarse granules, illustrated in Figure 2, *a*, *b*; but no signs of fatty degeneration could be seen, for the granules were stained violet by chloride of gold. Many lacunæ, as in *c*, showed no structure at all, the contents looking rather like a mass of coagulated albumen. In none of these lacunæ was the characteristic structure of protoplasm recognizable.

Fig. 2.



To sum up my observations, I found,—

First. The lacunæ contain a protoplasmic body, with a distinctly-visible net-like arrangement, to be regarded as the living matter of the protoplasm.

Second. The basis-substance is pierced by numerous coarse and fine canaliculi, communicating with each other, as well as with the lacunæ.

Third. The protoplasmic bodies, which do not quite fill the lacunæ, send offshoots of the living substance into the canaliculi, but can only be seen in the coarser ones.

Fourth. In necrotic bone, traces of former osteitis are visible, but no blood-vessels present in the Haversian canals, which are filled with micrococci.

Fifth. In necrotic bone, most of the lacunæ contain no protoplasm, but either a coarsely granular or a structureless mass,—remnants of the living matter and coagulated albumen.

DENTAL PATHOLOGY AND THERAPEUTICS.

BY J. FOSTER FLAGG, D.D.S.,

FORMERLY PROFESSOR OF DENTAL PATHOLOGY AND THERAPEUTICS IN PHILADELPHIA DENTAL COLLEGE.

[Entered according to Act of Congress, in the year 1873, by J. Foster Flagg, D.D.S.,
in the office of the Librarian of Congress at Washington.]

(Continued from page 191.)

Of all extraction I think that of the first *permanent molars* in early *middle life* is most fraught with unpleasant and uncontrollable sequences.

The proven tendency of the second bicuspid is decidedly forward, and it is only by strong and persistent wedging that it can be persuaded to move backward. This fact is often noticed in an attempt to wedge between bicuspids with the first molars out.

The proven tendency of the second and third molars is forward, and this is so strong that in the absence of the first molar the other molars will in time break down the barrier of a splendid retaining occlusion, and slowly but surely move to fill the unoccupied space.

The first result of this movement is a separation between the second and third molars. This separation increases until in time it begins to be annoying from the wedging of food between the teeth.

It is found that fragments of meat *will* be forced into the space during mastication, even though care is exercised to avoid the liability, and that the food, which is so easily lodged, is dislodged only with considerable difficulty.

This eventually becomes more and more annoying, until a *seeming* amelioration takes place; the space becoming wider, food is more easily removed, and the pressure *between teeth*, due to its presence, is much modified.

This season of relief is, however, generally very evanescent, for, with still gradually increasing width of separation, food *in mass* soon begins to be forced up against and under the gum.

The V-shaped opening between the necks of the teeth becomes impacted with *débris*, and the work begins of *picking out* the irritant with tooth-picks (wooden, quill, or even *metallic*), or with the familiar broom-corn, or, again (and worst of all), with *pins*.

It is not long before this eventuates in *periodontitis*. I have had six cases which have resulted in necrosis of the septa, but the usual extent of infliction is more or less tenderness of the teeth, and more or less jaw-ache, with eventual inability to use that side of the mouth with any comfort.

The remedy for this condition of things is, *possibly*, two-fold, viz., the closing together of the teeth by ligation (thread), and the maintenance of the contact by the *introduction of a plate* with a tooth attached, to replace the one lost, or the *extraction of another tooth*, generally preferably the wisdom-tooth.

It is usually, and I think wisely, deemed inadvisable to encumber a mouth with a piece of artificial work, for the replacing of one tooth, unless it is done for the sake of *appearance*, which consideration would seldom pertain to any loss farther back than a first bicuspid; *therefore* the *extraction of the second tooth* is the accepted means for affording relief.

But this is not *final*, although it works well, ordinarily, for quite a number of years. The second molar continues its forward progress, often in spite of very decidedly good *holding* occlusion, and as years pass by, the normal *perpendicular* of the tooth is lost, a gradually increasing *inclination forward* is observed, until *at length the inclination of* 45° *is reached.*

From this time trouble usually aggregates with considerable rapidity. The tooth soon becomes sore to bite upon; then too sore to use at all; then painful to strike *inadvertently* during mastication; then pulp trouble supervenes incident to external irritation, and, as an *aching*, *useless* organ, the *third tooth is extracted.*

This is no highly-drawn picture, but it is so frequent a succession of incidents that it seems to me, as I have said, *a subject which demands the serious consideration of the present and the "coming" dentist.*

But, on the contrary, this is by no means the universal result. So far from this being the case, it is again frequently the experience of patients that little or no discomfort is felt from this "separating" to which I have referred; and even should this be notably increased by a cavity of decay upon the distal face of the second molar, or the mesial face of the third molar, this can readily be made comfortable either by filling in *full* contour, or by the cutting of an *equally-free*, self-cleansing separation, and the introduction of the required comporting filling.

Nor is it invariably the case that peridental irritation follows the *absolute tipping over* of the tooth.. I have had three cases in which the teeth gradually assumed a *recumbent* position, during which process the pulps died, the apices of the roots came completely above the level of the gum, *leaving the apical foramina in full view*, and still the teeth were maintained in position through the vitality of the peridentium, doing comfortable and efficient service until the entire distal surface of the root *rivaled the enamel in polish*, *from attrition*, while giving more than *twice the normal extent of masticating surface* (!); and all this for many years, without the slightest change of color of the gum from irritation, and without the slightest interference with the integrity of the "*health line.*"

One of these remarkable cases I had the pleasure of presenting for examination to one of my classes at the Philadelphia Dental College, since which time I have extracted the tooth with my fingers. The second one was extracted about two years since, in the same manner; the third, becoming loosened and causing some irritation, was avoided for a time by the patient, until it was inadvertently bitten out during the past winter while masticating. It had done service as a *recumbent tooth* for several years.

But it is not alone the molars that are liable to peridental irritation, due to change of position from loss of teeth. The lower second bicuspids are particularly prone to this, as a result of loss of the lower first bicuspids, and the lower incisors are frequently affected in the same manner by loss of adjoining incisors.

Again, the superior incisors (frequently) and the superior cuspids (sometimes) are driven out of proper position from the undue antagonism and excessive use consequent upon loss of bicuspids and molars.

So frequently is the protrusion, loosening, *irritation*, and *loss of incisors* due to this cause, that it seems to me a text for the most earnest thought. For many years I have labored even more zealously for the preservation of the posterior teeth than I have for that of those more anterior.

Recognizing, *from inquiry and observation*, the far greater amount of comfort which patients experienced, who wore partial artificial dentures for front teeth, than those who wore dentures to supply the loss of back teeth, I concentrated my energies upon the molars and bicuspids, for the preservation of *comfort*, while the anxiety of the patients for the preservation of their personal appearance tended to supply any lack of energy which I might betray in regard to the incisors and cuspids. But in many cases of markedly soft teeth and rapid decay, in which protracted, painful, and expensive operations had repeatedly failed, until it was decided by the patients that "wholesale extraction" was the wisest treatment, I have pleaded for the saving *to the uttermost* of a few molars or bicuspids for clasping and masticating purposes, and have had the testimony of much gratitude from patients, and of many years of service from teeth, to sustain me in the faith as to the correctness of the practice.

III. *Salivary calculus—Tartar.*—A great deal of theoretic contribution to the literature of our profession has been made in the direction of this cause for periodontitis, but it has not seemed to me that any solid progress has yet been made beyond the fact of its existence. I admit, however, with much satisfaction, that decided advance has been attained in the manner of its thorough and *comparatively* painless removal, and cheerfully ascribe to this instrumentation a great modification in the *status* of this "opprobrium to dentistry."

I have used the two headings, "Salivary Calculus" and "Tartar," because, while I would not give it as a decided opinion, I nevertheless incline to the belief that the two are distinct phases of disease, dependent upon different sources of supply, and due to entirely different local conditions.

When this cause for peridental irritation exists, it is too tangible to the careful, practiced observer to require other than slight examination; but though to such an one this cause is thus easy of detection, with a less skillful practitioner it is often completely overlooked.

Nor does the dissimilarity cease here, for it is almost universally regarded, when found, as something requiring little time, little skill, and almost any kind of instrument for its removal, while only the expert recognizes the exceeding care, the patient manipulation, the length of time, the practiced skill, and the adaptability of instruments which alone can produce the desired result.

While a reasonably thorough removal of the more superficial and accessible portions of calculus or tartar will frequently produce such modification of peridental irritation as to be regarded with much satisfaction by both patient and practitioner, the vastly more perfect, *possible* result, is only to be attained by a completely thorough removal of every deep-seated and inaccessible particle of this irritating deposit.

My experience has been that no instruments which had been devised for the performance of this operation, prior to those invented by Dr. Riggs, were capable of doing anything such as would now be regarded as a *finished* piece of "scaling;" while with these instruments an educated hand can perform marvels in the bestowal of comfort, and in the notably permanent tightening of teeth which are in such condition as to appear absolutely *hopeless.*

IV. *Looseness of tooth or root.*—Under this cause I desire to refer to such teeth as have become loosened from loss of surrounding supporting structure (osseous and gum tissue), and such roots as have gradually been thrust out as semi extraneous and almost useless parts of organs.

In both these ways the leverage upon the exposed portion of tooth or root is constantly assuming a greater relative disproportion to the power of its retention, and thus it is that a condition, almost always incurable, is established.

Thus it is that when periodontitis develops from this cause the usual remedy is extraction of the tooth or root.

I have, however, in some instances retained, for further usefulness, clasp teeth which were giving serious trouble from looseness, by cutting off large portions of (and sometimes the whole of) the crown, thus relieving the pain and still clasping to the neck of the tooth.

Again, I have, in some rare instances, joined a loose tooth to a firm one by filling them together. These were cases when by so doing I thought it would subserve much good in the matter of mastication, or preclude, for a season, the necessity for resort to artificial work, or for a change of work already introduced, and I have been most agreeably surprised at the comfort attained, and at the durability of some of these experimental attachments. One, which has only recently failed, did service for over twelve years. As a rule, however, they have only lasted for from three to six years.

V. *Induration of tooth-tissue.*—Among the many conditions which are sad to behold, in connection with dental troubles, I know of no one which excites so much sympathy from me as this. To see a young and beautiful, but frail denture, melt away in defiance of the efforts for its salvation, is to see a delicate flower, the offspring of a day, blighted by the rays of a scorching sun. But to see an adult denture, magnificent in its solidity, which has proudly bade defiance to decay, and which has maintained its integrity for more than *half a century*, still lustrous, more than ever capable of doing duty, and with its every look scorning the idea of any loss of power; to see such a denture, day by day, becoming painful from its very goodness, slowly but surely becoming loosened from its increasing density of structure, and finally falling a victim to its *super-excellence*, just at a time of life when, of all others, it is most highly appreciated, and its loss most keenly deplored, is to see the sturdy oak uprooted in its glorious vigor, and to feel, most poignantly, our utter inability to offer help in time of grievous need.

And yet this *is* so. We know of nothing which can stay this process, and, as I relieve such sad, sad cases by extraction, while I have no heart to offer any attempts at consolation to my patients, I can only mitigate my own regret by trying to feel thankful that these cases are so few, while for the many we have so much that we can do.

VI. *Cavities of decay impinging upon cementum.*—Just in proportion as cavities of decay increase in size beneath the gum, so do they become the means of inciting to peridental irritation, in the two-fold manner of, 1st, affording lodgment for food, and insuring its retention until *putrescence* adds its irritating power to that of mere *pressure*, and 2d, while withdrawing the smooth support to gum-tissue which is essential to its normality, they offer the additional sharp and uneven edges which aggravate the tendency of in-growing (hypertrophied) gum, and thus by contiguity of irritation predispose adjoining tissues to inflammatory action.

In the treatment of these cases it is usually an easy task to relieve, by the daily *gentle* introduction of cotton pellets moistened with either carbolic acid or oil of cloves, taking care that the pressure is very slight, and recognizing that the object is, at first, *nothing more* than the *gradual absorption* of the hypertrophied gum, by *supporting* pressure, and the equally gradual filling of the cavity of decay as a preventive to the ingress of food.

It is, however, *occasionally* found that concomitant with this condition is *excessive sensibility* of gum-tissue, combined with a depth of cavity which entails the complication of possible pulp-irritation; it may be from *cold*, it may even be from *pressure.*

In such cases too much care, gentleness, and precaution can hardly be used.

Remembering the advice which I have endeavored to impress, *always* to use *tepid* water during dental operating, the cavity should be *very gently* syringed, and loose particles of food or *débris* carefully removed without infliction of pain. A *loosely-rolled rope* of cotton wool, something such as would be used for a canal-dressing, though larger and without the accurate taper, should be partly saturated with oily carbolic acid, and then dipped in the paste of acetate of morphia and oil of cloves.

It should then be taken in the thumb forceps, and after being held in the mouth a moment, to insure the proper temperature, be placed in position, and the medicated end be first cautiously passed under the gum, and into the cavity, by means of a small probe.

This should be followed by the dry portion of the cotton rope, which will take up the medicine as it exudes from the compressed portion of the rope, and prevent it from disagreeably escaping into the mouth.

Should it be that too much cotton has been prepared, the end should be cut off as closely as may be without touching the gum, *before all that is desirable* is introduced into the cavity.

This insures the possibility of *completely introducing* the medicated cotton, and thus lessens the danger of its accidental removal.

(To be continued.)

THE CASE OF THE WISDOM-TOOTH IN RELATION TO THE HYPOTHESIS OF THE ULTIMATE SUPPRESSION OF THE TEETH IN MAN.

BY A. H. THOMPSON, D.D.S., TOPEKA, KANSAS.

PART II.—DEDUCTIVE.

(Concluded from page 196.)

As to the *cause* of the deterioration of the wisdom-tooth in man, and of the contraction of its supporting environments, there is much that is known, but more yet remains to be learned. The great forces which are at work upon all animated nature are urging the wisdom-tooth onward towards final suppression, and are also influencing the remainder of the teeth in contemporaneous man, though in a less marked manner, to tend towards the same goal. The modes of the working of these forces and their probable results have been more or less fully delineated in the previous articles of this series in the DENTAL COSMOS. The bearing of general principles in the special application to the subject now under consideration must be fully borne in mind. Those great forces of universal influence which are bearing upon and coercing the wisdom-tooth must be recognized and studied; ignoring their presence and influence in any field of physiological research at this day is not only useless, but retrogressive and unsafe. The great masters of natural science have established the hypothesis of Evolution as a not only tenable theory, but as a living, working principle, and all investigation in all branches of science does but add fact to fact in its further confirmation, and the increasing knowledge of the great principle simplifies many heretofore difficult things in scientific research. As has been truly said,* "fully bearing in mind these great and demonstrable facts, the universal variability of all organisms and of all their parts, the possibility of accumulating their variations in definite directions, the enormous reproductive powers of all living beings, . . . the necessary survival of the fittest, etc., . . . we shall be able to see that the changes in external nature, animate and inanimate, continually going on, must produce indirect effects vastly greater and more important than any which, as Lamarck supposed, they can produce by their direct action on individuals as species." How these great and all potent forces have influenced the wisdom-teeth, it is our duty, if possible, to learn. A recent writer (Dr. H. S. Chase) has noticed some of these influences when he remarks,* "Among the causes of pressure of the teeth, I would suggest the rapid intellectual development of the race" (*i.e.*, the civilized portions?), "causing a retrograde evolution in regard to the size of the jaws. . . . The jaws might be shortened after the lapse of many generations by the extraction of teeth, 'in-and-in-breeding,' etc. . . . With increase in the capacity of the brain-case, there seems to be decrease in the size of the maxillæ. The substitution of food which requires but little exercise and power of the masticating muscles will, in a long series of generations at least, diminish the size of the jaws. This evolution of food is now going on, with regard to the race, without regard to the intellectual development of the individual."

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* DENTAL COSMOS, vol. xi. p. 490.

But we must hasten on to the consideration of the great forces which have a direct or indirect bearing upon the wisdom-tooth in inducing its disappearance.

The most active force in reducing the wisdom-tooth and its environments is that of *disuse.* This great cause has doubtless continued and accumulated in its weight and effects through countless generations, accelerated and assisted by inheritance of imperfection and degeneracy, transmission with increased deterioration, and augmentation of tendency towards final disappearance of the organ. We conclude that the wisdom-tooth can only be considered as a rudiment, having been coerced into retrogressive evolution by the effects of disuse upon the tooth and the jaw, causing imperfect formation of the former, and contraction of the latter, through the laws of economy of growth and correlation. The workings of the law of economy of growth and of the effects of disuse are thus tersely stated and described by Mr. Darwin, in which the special application to the case of the wisdom-tooth in man is observable. He says of disuse,† "It is notorious . . . that increased use or action strengthens muscles, etc., . . . and that disuse, on the other hand, weakens them. The flow of blood is greatly increased towards any part which is performing work, and sinks again when the part is at rest; consequently, if the work is frequent, the vessels increase in size, and the part is better nourished. . . . ‡Disuse at that period of life when an organ is chiefly used, and this is generally during maturity, together with inheritance at a corresponding period of life, seem to have been the chief agents in causing organs to become rudimentary. The term 'disuse' does not relate merely to the lessened action of muscles, but it includes a diminished flow of blood to the part or organ from being subjected to fewer alternations of pressure, or from becoming in any way less habitually active. . . . *As the early progenitors of man . . . gradually acquired the habit of using stones, clubs, and other weapons for fighting, . . . they would have used their jaws and teeth less and less. In this case the jaws, together with the teeth, would have become reduced in size. . . . †Continued disuse . . . weakens and diminishes all parts of the organization." He refers, also, in the same connections to the laws of economy of growth and rudimentary organs, in which we also notice the application to the subject in hand. He says,‡ "Rudimentary organs . . . are generally variable, . . . for, being useless, they are not regulated by natural selection, and they are more or less liable to reversion. . . . We do not know through what steps under nature rudimentary organs have passed in being reduced to their present condition; but we so incessantly see in species of the same group the finest gradations between an organ in a rudimentary and perfect state, that we are led to believe that the passage must have been extremely gradual. It may be doubted whether a change of structure so abrupt as the sudden loss of an organ would ever be of service to a species, . . . for the conditions to which all organs are closely adapted usually change very slowly. Even if an organ did suddenly disappear in some one individual by an arrest of development, intercrossing with the other individuals of the same species would tend to cause its partial reappearance; so that its final reduction could only be effected by some other means. The most probable view is, that a part which is now rudimentary was formerly, owing to changed habits of life, used less and less, being at the same time reduced in size by disuse, until at last it became quite useless and superfluous. . . . As soon as a part becomes useless, another principle. that of economy of growth, will come into play, as it would be an advantage . . . to save the development of any useless part. . . . But as soon as a part is much reduced, the saving from its further reduction will be insignificant; so that this cannot be effected by natural selection. . . . Mr. Romane's view . . . is: 'All parts are somewhat variable, and fluctuate in size round an average point.' Now, when a part has already begun, from any cause, to decrease, it is very

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* Mo. Den. Jour., vol. viii. p. 257.

† Var. Plants and Animals under Domestication, vol. ii. p. 285.

‡ Des. Man., vol. i. p. 18.

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* Des. Man., vol. i. p. 138.

† Var. under Domes., vol. ii. p. 345.

‡ Ibid., p. 307.

improbable that the variations should be as great in the direction of increase as of diminution, for its previous reduction shows that circumstances have not been favorable for its development, whilst there is nothing to check variations in the opposite direction. If this be so, the long-continued crossing of many individuals furnished with an organ which fluctuates in a greater degree towards decrease than increase will slowly but surely lead to its diminution. With respect to the absolute abortion of a part, a distinct principle, that of pangenesis, comes into play. . . . * Rudimentary organs are either absolutely useless, . . . or are of such slight service to their present possessors that we cannot suppose that they were developed under the conditions which now exist. Organs in this latter state are not strictly rudiments, but are tending in that direction. . . . Rudimentary organs are extremely variable, and this is partly intelligible, as they are useless, or nearly so, and are no longer the subjects of natural selection. They often become wholly suppressed. When this occurs, they are, nevertheless, liable to reappear through reversion. . . . †With animals living a free life, and occasionally exposed to severe competition, the reduction would be greater, as it would be an advantage to them to have the development of every superfluous part saved. With highly-fed domestic animals, on the other hand, there seems to be no economy of growth, or any tendency to the elimination of superfluous details." It may thus be, indeed, that high feeding in man tends to retain the wisdom-tooth, while, as we shall see hereafter, it also tends to shorten the jaws, and thus continues antagonistic influences. Mr. Darwin also says,‡ "In some cases organs have been reduced by means of natural selection, from having become injurious to the species, under changed conditions of life. The process of reduction is probably often aided through the two principles of compensation and economy of growth; but the later stages of reduction, after disuse has done all that can be fairly attributed to it, and when the saving to be effected by the economy of growth would be very small, are very difficult to understand, unless on the theory of pangenesis." We can thus readily comprehend how the great forces of disuse and economy of growth have contributed towards, and in fact seem to have been the principal agents in, the reduction of the wisdom-tooth and its environments in man.

A minor force to be considered is that of *heredity*, but which is, of course, intimately connected with those which we have noticed. Its rapid action upon families in causing the reduction of the wisdom-tooth has been noticed by every one. Mr. Felix Weiss (op. cit.) has noted a family in which "the grandfather erupted all the wisdom-teeth; the son had one absent and one reduced; and the grandson had the uppers absent and the lowers reduced. It could hardly be said that these results were due to want of nourishment, for they were all fine men." He concludes "that the existence of the wisdom-tooth depends more upon mind-development, or civilization, than upon physical development or strength." The extensive distribution among the races of man of the tendency to its suppression and of the occasional absence of this tooth, has contributed largely in a direct manner towards its reduction. The increase of the transmission of defects is going on from generation to generation, and can only terminate in its abortion.

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* Des. Man., vol. i. p. 17.

† Var. under Domes., vol. ii. p. 289.

‡ Des. Man., vol. i. p. 18.

Mr. Darwin's rules concerning heredity seem to possess an especial application to the case of the wisdom-tooth. He says,* "Even if an organ did suddenly disappear . . . by an arrest of development, intercrossing . . . would tend to cause its partial reappearance," thus showing the power of heredity to restore a part where a sudden tendency towards its loss had begun; and it must also transmit the deterioration of the wisdom-tooth which is spreading and increasing throughout all civilized peoples. Of the retention of organs he says,† "During the many changes which have caused . . . parts or organs to become at first useless and ultimately superfluous, . . . the retention of such parts in a useless and rudimentary condition is intelligible on the theory of descent." Or again,‡ "In many cases there is reason to believe that the lessened use of various organs has affected corresponding parts in the offspring. But there is no good evidence that this ever follows in the course of a single generation. . . . Several generations must be subjected to changed habits for any appreciable result to appear." Inherited mutilations may sometimes have something to do with the absence of this tooth. On this subject Mr. Darwin gives a rule which applies in our case: "There is considerable evidence that the effects of mutilation and of accidents, especially, or perhaps exclusively, when followed by disuse, are occasionally inherited." He notes many cases in which mutilations are not inherited and are in our department§ of "different races of men who have from time immemorial knocked out their upper incisors" without any transmitted effect,—a case evidently in point as not being influenced by disuse; but in the case of the wisdom-tooth, the mutilation of extraction may, indeed, have the effect of causing its transmission, owing to disuse.

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* Var. under Domes., vol. ii. p. 308.

† Ibid., vol. i. p. 120.

‡ Ibid., vol. ii. p. 287.

§ Ibid., vol. i. p. 466.

As to the effect that the *late period* of life at which the wisdom-tooth erupts may have, it is scarcely distinct. The period seems to be becoming later and further removed into the maturer years. In the higher apes, as noted before, it appears in the males before the canine, and the corresponding attainment of sexual maturity, and in the females about the same time as the canine. It is probable that its rudimentary character has much to do with its erratic behavior, and with the irregular and gradually extending age of appearance. Its imperfect and incomplete construction, consequent upon compression, may cause a delay that increases as the imperfection increases.

The law of *correlated variation* is one which applies with especial force to our subject, in the effect wrought through its workings upon the maxillæ in influencing their contraction. Of the correlation of the jaws, and more apparently of the lower jaw or mandible and the limbs, in vertebrate animals, there is little question. Nearly if not all anatomists and naturalists are agreed upon their being intimately related, and upon their homology. And as Mr. Darwin remarks,* "Parts which are homologous tend to vary in the same manner, . . . for such parts are identical in form and structure during an early period of embryonic development. . . . The face or head and the limbs usually vary together in general proportions. . . . †In man, as in the lower animals, many structures are so intimately related, that when one part varies so does another. . . . Homologous parts are particularly liable to change together, as we see in the opposite sides of the body, and in the upper and lower extremities." . . . In regard to the wisdom-tooth, its various conditions in different races, and the various influences which have modified it, he says,‡ "Prof. Schaaffhausen accounts for this difference between races by the posterior dental portion of the jaw being always shortened in those that are civilized, and the shortening may, I suppose, be safely attributed to civilized men habitually feeding on soft, cooked food, and thus using their jaws less. . . . §From the correlation which exists, at least in some cases, between the development of the extremities and of the jaws, it is possible that in those classes which do not labor much with their hands and feet the jaws would be reduced in size from this cause. That they are generally smaller in refined and civilized men than in hard-working men or savages is certain. But with savages, as Mr. Herbert Spencer has remarked, the greater use of the jaws in chewing coarse, uncooked food would act in a direct manner on the masticating muscles and the bones to which they are attached." Thus the direct influence of direct disuse and of correlation supplement and aid each other in the contraction of the jaws. The correlation of the variability of the jaws and limbs has been demonstrated in lower animals. Mr. Darwin states* that in them "the skull and limbs are apparently in some manner correlated, so that any change in the one tends to affect the other."

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* Var. under Domes., vol. ii. pp. 314–15.

† Des. Man., vol. i. p. 125.

‡ Ibid., p. 26.

§ Ibid., p. 113.

High feeding may have done much, and may act directly (as in breeding domestic animals) upon the jaws. As Mr. Darwin says* of some lower animals, "Nathusius states positively, as the result of common experience, and of his experiments in raising pigs, that rich and abundant food, given during youth, tends by some direct action to make the head broader and shorter; and that poor food works a contrary result. . . . It is well known that there is a strong tendency in many domestic animals . . . for the bones of the face to become greatly shortened. In the case of the dog . . . this seems caused by an abnormal state of the primordial cartilage. We may readily admit that abundant and rich food, supplied during many generations, could give an inherited tendency to increased size of body in the pig, and that from disuse the limbs would become finer and shorter." This law of high feeding in regard to the jaws in man may be worth consideration, for undoubtedly contracted arches are associated, very frequently, with such habits.

Mr. Darwin has observed† "that in short-muzzled dogs the molar teeth stand obliquely, whilst in the long-muzzled races they are placed normally, with open spaces between them," thus showing the effect of contraction.

We may conclude by repeating that all the characteristics of, and the phenomena presented by, the wisdom-tooth in man, indicating its imperfection and abnormality in almost every respect, point toward its speedy disappearance in the more civilized races. Restoration to its primitive perfection and usefulness does not appear to be either possible or desirable; and any method of dieting or mode of living which may tend to conduce to that end would be found to be too impracticable for adoption, and would be utterly ineffective if attempted. Facts are stubborn things; and the one great fact we have to face in treating this subject is, that this tooth is tending towards final and inevitable disappearance, and that it would undoubtedly disregard the most promising methods of interference that could be inaugurated in an attempt to modify the ultimate result of its final loss in man.

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* Var. under Domes., vol. i. pp. 75–6.

† Ibid., p. 36.

It is interesting to notice that we are here the contemporary witnesses of the process of the suppression of an organ, with a tendency towards its abolition. The progress of this procedure in the *Anthropoidæ*, which may be traced, as we have shown, from the higher apes to contemporaneous man, thus making a long history of deterioration and suppression, is manifestly of the kind that will result in its final and, perhaps, speedy abolishment. Many things indicate this result, which in our day seems almost in visible progress. We may even safely predict that a very few generations will suffice to see the first-fruits of the final results attained, in the phenomena of its almost universal injury to the mouth, the production of great suffering to the individual, and of injury to the remaining teeth by crowding, etc. These effects will necessitate the regular and systematic extraction of the tooth as soon as, or before, it appears. We may even see cases at this early day in which this operation is indicated, and there is every reason to believe that with continued shortening of the jaw and the lingering persistence of the tooth, through inheritance, the necessity for the removal of the tooth, where it yet remains, will increase until it becomes universal.

And what of the other teeth? We find by close investigation that the second molar is likely to follow in the wake of the third, in the methods of its disappearance from man. It very frequently presents many of the imperfections that appertain to the wisdom-tooth, and with the loss of the latter, and the further contraction of the jaw upon the territory of the second molar, the effect and result will be the same. Indeed, it is possible that the premature maxillary contraction already affects it by forcing the wisdom-tooth against it, but as this does not occur until after eruption, the effects of compression during the earlier periods of formation and eruption are not felt, as there is then abundance of room. That the second molar is somewhat deficient in form in many cases has been frequently observed. Mr. C. S. Tomes* tells us that "in many low races the second lower molar has five cusps, just like the first: this is so, also, in the anthropoid apes, but in the European races the fifth cusp is generally wanting." Indeed, we may say that the second molar is in the same comparative condition in civilized man that the third molar is in some of the higher apes, *i.e.*, complete and useful, but deviating slightly from perfection.

In regard to the remaining teeth in man, we may safely conclude that none of them will be lost by the same process which is destroying the third molar and encroaching upon the second. General deterioration has progressed so far that the remaining twenty-four teeth will disappear before a general suppression that will take effect more or less simultaneously. The especial susceptibility to the attacks of disease, and the chronic diseased condition of the teeth, will work in a direct manner upon their continuance in man, through the laws of inherited mutilation, supplemented by disuse, which forces, in combination, will likely be the most effective in the further reduction of the teeth in man. It does not appear that the suppression of the teeth in lower animals is ever accompanied by the phenomena of disease and the various pathological conditions which are exhibited in man. Yet the combination of forces which are degrading the teeth and reducing them, reasoning from analogy, renders it highly probable, according to all human power of prediction, that the "coming man," whatever else he may be, will certainly be edentulous.

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* Op. cit., p. 382.

SOFT FOIL AND THE WEDGE PRINCIPLE vs. COHESIVE FOIL AND THE WELDING PRINCIPLE.

BY GEORGE W. WELD, D.D.S., NEW YORK.

(Read before the First District Dental Society of New York, Feb. 5th, 1878.)

The object of this paper is to consider, first, the relative merits of soft and cohesive foils, as now prepared for filling teeth,—which one can be most easily manipulated, and which one conforms to all the requirements necessary to a perfect filling; second, which principle of packing gold forms the most perfect union with the cavity walls, and is best calculated to give the most permanent results.

Let me premise by saying that, as an advocate of soft foil and the wedge principle, the ideas which I shall present do not entirely conflict with the present method of filling teeth with cohesive foil and the mallet, except so far as the preparation of cavities necessitates the cutting away of good tooth-substance to obtain favorable angles for the proper welding of the gold. That while I appreciate the usefulness of the mallet and cohesive foil for building "golden crowns," I see many advantages in soft gold when introduced and consolidated by the old-fashioned wedge principle; and I am constrained to say, in view of the general laws and principles under which all the subordinate phenomena of facts relating to this subject are comprehended, that the dentist of to-day who depends *exclusively* on the mallet and cohesive gold cannot claim the same success in the results of his operations as he who calls into requisition the art of filling teeth by the wedge principle and hand-pressure. It is not the exhibition cases we see at the monthly clinics that serve as guides; they are superlative. Their perfection is the result of much labor, time, and expense. They stand on a much higher plane of excellence than the general average of results; but it is the work of the great mass of operators, good, bad, and indifferent, the *general effect*, that must serve as a criterion.

To my mind it is not all of dental art to build down a gold crown with a mallet and cohesive gold. Such an operation may be considered brilliant; but there are other operations, when performed intelligently, both as to the art and the science which relate to the material used, and the manner of using, equally as brilliant and satisfactory.

The art of filling a *small cavity* may not require as much time, or, for the time being, add as much luster to the dentist's fame; but the knowledge and the art which best preserve the small cavity and prevent a large one deserve far more credit. The success of a large filling rests mainly with the faculties employed at the time of the operation, and the result is good or bad in proportion to good nerve, correct eye, and perfect consolidation of the gold. But the most essential requisite to success with the use of the mallet—having, of course, good instruments and perfect dryness—is *direct pressure*.

Starting, then, with the proposition that direct pressure is an indispensable condition to success with the mallet system, we are led to inquire, Is direct pressure always to be obtained? And, if not, what is the conclusion to which such a condition of things may lead?

The advocates of the mallet system assert that all foil ought to be impacted by the aid of the mallet, and by "that impact driven true to its aim." But are not a majority of the cavities we meet with in our daily practice in such unfavorable positions as to positively forbid this "impact driven true to its aim?"

It is a general law of matter that all bodies tend to move in a straight line; consequently, when a body moves in a curve, there must necessarily be some force which acts upon it, and deflects it from its true course. Now, to make use of a homely expression, it is about as easy to shoot around a hay-stack as it is to weld cohesive foil with a percussion-blow when the force applied is not acting on a point in line with its direction; the result in either case is about the same.

The advocates of soft foil contend, therefore, that cohesive foil should be used *only where direct pressure* can be obtained without destroying good tooth-substance. It is just at this point where all the trouble of the mallet system begins, viz., by trying to obtain that which cannot be obtained; to do what, from the condition of things, cannot be done. It is just here, also, that soft foil and the wedge principle prove their superiority over cohesive foil and the welding principle.

Soft foil is pliable and plastic in its nature. It can be introduced into a cavity at different given angles, and, by the use of right-angled instruments, perfectly manipulated. It invariably possesses qualities which admit of tractive power. Its merits are two-fold. First, its character as a plastic material to some degree, and consequently its easier and more perfect adaptation to the walls of a cavity; secondly, the facility of introducing, consolidating, and perfectly finishing the gold under difficult and unfavorable conditions.

The use of soft and cohesive foil, as is well known, at least to the older members of the profession, implies in each case different processes, different manipulations, and different instruments and gold. Soft foil means the wedge principle; cohesive foil the mallet and welding principle.

The wedge principle implies resistance, or that the walls of the cavity are either intact or very nearly so; it being necessary to have at least three walls to wedge the gold.

The welding principle implies either a cavity with walls intact, or a cavity with broken walls, or both. With soft foil and the wedge principle, the pressure is uniformly lateral. With cohesive gold and the mallet, the pressure is mostly in line and perpendicular to the bottom of the cavity, or longitudinal.

Soft gold takes a better impression of the walls of a cavity; and as the wedge principle gives more lateral and effective strength, a closer union between the walls of a cavity and the gold can be obtained.

The use of soft foil is conservative. The use of cohesive foil is destructive, for its perfect manipulation often necessitates the cutting away of good tooth-substance to obtain that indispensable condition, *direct pressure.* Let us take, for example, an approximal cavity between the two superior incisors,—Fig. 1. The lingual wall is broken away, leaving, as retaining points to hold the gold, the cervical, labial, and distal walls. In such a case direct pressure cannot be obtained, and the cavity cannot be perfectly filled by the mallet system without first cutting away either one or two of the cavity walls.

Fig. 1.

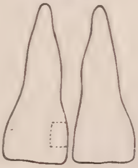
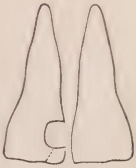


Fig. 2.



If the labial wall is destroyed, which is frequently the case, as in Fig. 2, the gold may properly be introduced into the cavity on the welding principle. But the cutting of the labial wall very materially weakens the distal point, and although the cavity has been well filled this point soon breaks off, and the patient returns to the dentist to have the tooth refilled.

To obviate this breaking of the point, the mallet operator cuts away not only the labial wall, the strength and support of the tooth, but also the distal point, making a partial golden crown, as Fig. 3.

Now, the methods which prescribe such a procedure are destructive, besides being unnecessary; for such a cavity as the one just described can always be filled without destroying either the labial or distal wall by the use of soft foil introduced and consolidated on the wedge principle, and when filled is less expensive and more serviceable. Again, take two small approximal cavities between the bicuspids or molars. See Fig. 4. The mallet operator, such a position being unfavorable to direct pressure, cuts from the crown down to each cavity, making large crown and approximal fillings, as in Fig. 5. Now, such teeth as the ones just described *have been* and *can be preserved* by the use of soft foil and right-angled instruments, without cutting away and destroying so much good tooth-substance.

Fig. 3.

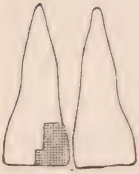


Fig. 4.

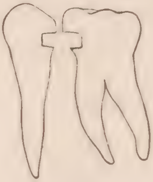
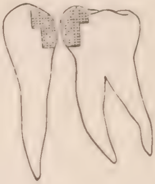


Fig. 5.



The whole tendency of the dental art, at the present time, is toward pliable and plastic material for filling teeth.

Pure tin is pliable and plastic in its nature. How beautifully it works! How like a charm it adapts itself to the inequalities of a cavity! What a compact mass of metal it forms! It is, like soft foil, in perfect harmony with the object it is seeking to preserve. When introduced it is plastic; when finished, metallic.

This principle of plasticity in material for filling teeth supports the use of amalgam. It may be said that a good amalgam filling will preserve a tooth better and for a longer period of time than a poor gold one. And if poor gold fillings are frequent results of the mallet and the use of cohesive foil, it naturally follows, as a consequence, that amalgam must grow in favor as a material for filling teeth. And amalgam has grown in favor, and is looked upon by the profession at large with more respect to-day than ten years ago, disguise the fact as we may. And for what reason? Do you say, because of improved amalgams? I answer that amalgam fillings oxidize and blacken the same to-day as they have always done. That is not the true cause. The reason is obvious. The amalgam is in almost every case properly introduced and forced against the sides of the cavity.

The tooth, when filled, is well filled. But not so with the positive cohesive foil,—for, alas! in too many cases, I fear the teeth have been imperfectly filled and finished,—else why the general complaint of decay around the mallet fillings of good operators? Can the extended use of amalgam be attributed to any other cause but the use of non-ductile foil, indirect pressure, and imperfect manipulation?

Now, I do not wish especially to commend the use of amalgam; but it performs a duty; it possesses some qualities which are to be admired, and which cohesive foil never can possess. And I believe its usefulness as a material for filling teeth is greater than *cohesive foil* in the hands of lazy and unskilled dentists. Let us consider, for a moment, what classes of dentists make use of amalgam. There are two classes. First, the dentist who operates mainly for the poorer class of people, and cannot receive in return for gold, time, and skill employed just compensation. Secondly, the indolent dentist, who either cannot or will not exercise his body and mind sufficiently to properly introduce and consolidate gold.

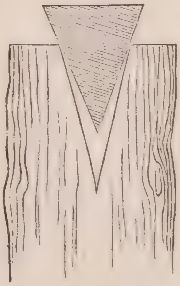
I have purposely alluded to amalgam as a material for filling teeth, to endeavor to impress on your minds the importance to be attached to any metal for dental use possessing plastic quality, and in contrast to show the comparative absence of this requisite in cohesive foil, which to my mind, together with the unavoidable angles and the indirect pressure applied to consolidate the gold, is the great cause of decay around mallet fillings.

Thus far, I have spoken only of the relative merits of soft and cohesive foils, and the advantage of direct pressure. I will now call your attention to the principles which govern their use, and attempt to prove that the welding principle is not only defective for preserving teeth when the pressure is applied indirectly, but also even with favorable positions and direct pressure; the sides of the cavities being the vulnerable points, the adaptation of cohesive foil to the cavity walls is not so perfect, nor can, as a rule, be made as perfect, by the mallet and the welding principle as it is with the use of soft foil and the wedging principle.

To bear me out in such an assertion, your attention is directed to one of the six mechanical powers, viz., the wedge. This is a simple machine, which, as is well known, converts a small force acting through a great space into a great force acting through a small space, or *vice versa*.

When a wedge is used in rending wood or other substances, the parts of the block before it are generally separated (see Fig. 6.), in which case it acts besides as a lever, the power being applied at the end of the block, or acting part of the wedge, and the resistance being at the point where the fibers begin to separate.

FIG. 6.



If now we suppose the wedge to be urged by pressure, the action of the wedge is precisely the same in point of mechanical advantage as that of the inclined plane. It is obvious that more lateral force can be applied by the use of the wedge than by any other known power, and it is principally *lateral force* that is required, and which is not obtained in the mallet system, to form the most perfect union between the walls of a cavity and the gold.

If, then, soft foil more readily adapts itself to the walls of a cavity; if the sides of the cavities are the vulnerable points; if the "wedge principle" possesses a mechanical advantage, and lateral pressure is more effective than longitudinal pressure, can the conclusion be anything but unfavorable to the use of cohesive foil and the mallet? If there is any advantage in filling a *small cavity* on the welding principle, the writer of this article—who, however, is open to conviction—is, at the present time, unable to see it. And it remains, therefore, for some mallet devotee, who possesses, perhaps, a clearer vision and a deeper insight into mechanical law, to show wherein it lies.

TRANSLATION.

A PROPOSITION LOOKING TO THE ESTABLISHMENT OF A PLAN OF STUDY FOR SUCH AS ARE ABOUT ENTERING THE DENTAL SPECIALTY.

[Translated from the German of C. Sauer, being the leading article in the *Deutsche Vierteljahresschrift für Zahnheilkunde*, for January, 1878.]

The desire for reform in the nature of the instructions received by dental students in Germany is enlarging itself widely, being not at all confined to the old and experienced, but diffusing itself through the ranks of the young, even to those who have just left the university.

As in the one circle, so, also, is it recognized by the highest of medical authority, that such a necessity for reform exists. The examining medical board could not, however, look carefully into the requirements, but has found itself compelled to depend, as far as examinations are concerned, upon the status given by the progressiveness of the specialty itself.

The claim as to requirements is already sufficiently exalted. We see, in North America, the practical part of the business well and fully taught, but in North America no pretensions are made as to affording in the college courses anything in the way of scholarly acquirements. In matriculating, it is only necessary for the student to prove that he has worked, is working, two years with a dentist,—the time spent at the schools being permitted to count in this requirement; the general student course being, in reality, comprised in two winter courses of five months each.

A recognized advantage possessed by the American over the German course lies in the clinical observations there enjoyed, such advantages being with us almost an impossibility.

The practical instruction preceding the special study is, in Germany, comprised within a half-year, and this is not received in any institution connected with the university, but is sought commonly at the hands of some practitioner. In the university no clinical instruction at all is given. This deficiency is felt by the student, whatever may be the extent of his good-will towards his school. Wherever he goes it is the same, notwithstanding it is contrary to the needs and wishes of all who would learn the art. It seems to be the idea that it is the dentist alone who can afford practical instruction, yet the proper measure is to be found by combining clinics of dentistry and surgery. In other words, the meaning of the circle of the specialty is to be understood alone through its relations with the greater circle of surgery, to which it properly belongs. A dentist, as existing in ordinary, is a mechanic, nothing more, nothing less. It is alone as a medically educated man that he possesses claims to be esteemed as professional. It is not possible any longer for the specialty to occupy its present equivocal position. The dentist must advance into the surgeon, or he must be satisfied to have the measure of himself and of his services limited by intelligent people to such mechanical offices as the filling and making of teeth. It would be in such an association of clinical instruction that our young colleagues would find themselves converted into oral surgeons, to be which requires, of course, that one accomplish both the greater and the lesser circle.

If we come to an acquaintance with the so-called "American dentist" we come as well to a recognition that his most characteristic peculiarity consists in his styling himself "graduate," if not always with right. We Germans are without such recognition of graduation, even though we have to face so formidable a matter as a state examination. One sees in our profession in America much to commend, yet, at the same time, cannot shut his eyes to the poverty of much of the pretension, particularly in that direction which in strictness is to be termed professional.

In Germany, the fault lies alone in the absence of clinical practice. The advantages, as theoretical studies are concerned, are all that can be desired. The student of dentistry pursues his observations side by side with the student of medicine. Speaking generally, there is nothing here that one could desire to see changed. Such character of study makes the symmetrical man, and well fits him for the study of a specialty. A specialist so educated is naturally a wider practitioner, because of that for which he has been fitted by his advantages. For entrance on such a theoretical course, it is to be desired that a preliminary order of study be instituted; to this end we would propose a commencement with the lessons of physiology on one side, and those of chemistry and physics on the other. To a student of medicine the themes of physiology are simply necessities; for the dentist they are likewise full of worth; little will he find himself able to understand of mouth and teeth diseases without these lessons. He who instructs himself in such direction is later wholly at home with his practice. A knowledge of chemistry, particularly of inorganic, is found to confer peculiar benefit on the dental student; that is, as are concerned a knowledge of earths and metals. The organic is not found so necessary. Advantages arise equally out of an understanding of physics; this study may be pursued by the student in connection with his lessons in mechanics, or may follow such lessons. It is unfortunately the case that few dentists can justly lay claim to any particular knowledge of microscopy.

By an earnest co-operation a properly qualified faculty of any German university might readily bring what is necessary to the requirements of oral surgery, by determining on a professor and a plan, and by the necessary consultations with the incumbent of the department made.

For several years this subject of education has been the standing theme of German dental gatherings. Distinguished among the views advanced are those of our honored colleague von Langsdorff, presented at the last yearly meeting of the Central-vereins, and published in a late number of the *Vierteljahrsschrift*.

Some two years ago I had the opportunity, in association with others alike interested, to frame a plan for the development and government of the specialty, which, with some modifications, is similar to that of Dr. Langsdorff. This plan I conceive to be adapted to its purpose, for the reason that it has a foundation based upon a consideration of all the pros and cons of the subject. At any rate, it furnishes a proper support for a better. This better would be the passage of the student from a pursuit of the studies mapped out into that wide field presided over by the medical board. This last is the more to be hoped for, as ground is taken that the plan proposed must have found in it reconciliation with the requirements of that board. In consideration of the opportunity to offer for the medical examination, the time for such a preliminary study course is fixed at two years and a half. For the study of the dental art, the time is at present two years and a half,—twenty-four months for general practice, six months for the laboratory. This space of time for all the various matters is very little. By the new plan, such time may be lengthened as found necessary.

The proposed plan is divided into five terms: a first term preliminary, then four regular terms.

The Preliminary Term.

1st. Instruction in mechanics divided into the course (Practice in the use of tools, with illustration by operations upon the mouth. Explanation of tooth-form. Instruction in the treatment of metals), and in a course of practice, guidance in the preparation of dentures, obturators, etc., to be made in bone, metal, and gutta-percha to the fit of models.

2d. Inorganic Chemistry, with special attention to Metallurgy.

3d. Organic Chemistry.

4th. Physics.

5th. Descriptive lessons in Machinery.

First Course.

1st. Histology.

2d. Descriptive Anatomy.

3d. Preparatory practice.

4th. Physiology.

5th. Mechanics; course under guidance.

Second Course.

1st. Topographical or Surgical Anatomy.

2d. General Pathology and Pathological Anatomy.

3d. Physiological Chemistry.

4th. Microscopical course. Pathology of the Teeth.

5th. Mechanics; course under guidance.

Third Course.

1st. Special Pathology and Therapeutics.

2d. General Surgery.

3d. Oral Surgery.

4th. Clinics in Oral Surgery, including Diseases of the Teeth.

5th. Dental Operations.

6th. Lessons on Diseases and Treatment of Dental Pulp and Periosteum.

7th. Mechanics. Preparation of Dentures, Obturators, Artificial Noses, Ears, etc.

Fourth Course.

1st. General Surgery.

2d. Oral Surgery, inclusive of Diseases of the Teeth.

3d. Surgical or mixed clinic.

4th. Oral Surgery.

5th. Reviewing in Anatomy, Physiology, Chemistry, and Physics.

6th. Mechanics, as in third course.

If in this plan large stress is laid on instruction in the mechanical branches, it arises out of the experience of many years. I have for some time past had under my instruction a large class in the mechanics of the specialty. It has been my aim to increase the interest in this subject, and to this end clinics in operative dentistry are held. This, one is able to accomplish only indifferently in private practice. These clinics have enabled me to understand the wants of students. I have found out that such students as enjoy clinical advantages, at first in company with a preceptor, and later by themselves, attain to peculiar proficiency. Such advantages, however, considering the proportion of time that is to be secured out of the study-hours, are not easy to come by, the difficulty lying in the fact that in the present study-plan no provision has been made for any such purpose. All things necessary for the perfection of the young dentist are to be obtained, however, under the present system, provided that after the state examination a year be spent as assistant to a practitioner. The student is thus brought in practical contact with what may be termed diagnosis and the use of instruments, and secures to himself proper ideas of the meaning of individuality in practice.

Only after the experience that comes out of such clinical relation with the proficient is a young practitioner found able to take the place of the elder, and this association is to follow the scholastic training. It is observed with pain, and as a thing not at all to be commended, that the old practitioners are found to favor as assistants the ordinary workman, and that at the same time the collegians incline to turn away. The ground of this lies in the old-time conclusion that the workman, through his skill of hand, is better fitted to appreciate the needs of operations; also, that he will be more under control.

A laboratory and a clinic for the study of the specialty of oral surgery connected with the general surgical clinic at Berlin would, according to my view, be not only invaluable to the special student, but as well to students of general medicine, particularly as opportunity would be afforded by such a laboratory for practice in mechanical appliances to those whose destination is surgery. Also many other practical uses would such a laboratory afford to the general clinic.

These propositions looking to a connection with a university education are offered with the hope that interest will increase in the subject, and that my colleagues will ventilate the subject thoroughly, each in his own mind, and that all will approach the next meeting with a desire to further these views and those that were earlier advanced by our colleague von Langsdorff.

A. B. C.

PROCEEDINGS OF DENTAL SOCIETIES.

NEW YORK ODONTOLOGICAL SOCIETY.

(Continued from page 220.)

A PAPER entitled "On the Harmony of Antagonism,"* by Dr. McQuillen, was then read.

The following paper, entitled "Epithelium," by Dr. W. H. Atkinson, was then read:

This, like nearly all the technical words used in natural history and science in general, comes to us through a language now dead and out of use for the ordinary purposes of life.

All discoveries in new fields of bodies or actions of bodies, are first nominated in the language at the command of the discoverer, and the only marvel is that they have been as well nominated as they have, when we consider the narrowness of the range of knowledge of forms and functions of bodies known to the early observers.

(ἐπί), *Epi*, upon, and (θηλή), *Thele*, the nipple, gives us the root of the sense of our word Epithelium. It is justified in the common use that has been made of this term to designate the red margins of the openings of mucous cavities, as instanced in the lips, eyes, vulva, and nipple of the mammæ, in which the differentiation between mucous surface and dermal surface is marked by an absence of the "rete mucosum" or "Malpighian layer," and the immediate superposition of the epithelial bodies upon the papillæ (thelia—nipples) of the true skin, in which the blood-vessels are shown through the diaphanous epithelium by the peach-blow tint that marks the absence of the mucous layer of the skin at these points.

To this restricted meaning of the word epithelium there is serious objection, and after this justification of the use of the term, I propose to carry it throughout the whole range of organized bodies in which these special tissual elements make their advent, fulfill their mission, and are shed in the production of the various secretions and excretions, and when not thus used desquamate to give place to their lineal successors, in order that secretion and excretion may be normally maintained.

The last sentence asserts the evanescent character of epithelial bodies, and suggests the query, "From whence do their successors arise?" A satisfactory reply to this question involves a knowledge of the origin of these elements of tissue which is, as yet, not obtained to the satisfaction of all observers.

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* Dr. McQuillen has failed to furnish us a copy of his address, though many times requested to do so. The paper and the discussions upon it are thus necessarily omitted.—SECRETARY NEW YORK ODONTOLOGICAL SOCIETY.

Some maintain, with Schleiden and Schwann, that they arise *de novo* out of blastema; others that they arise by segmentation of leucocytes or wandering cells, floating in pabulum, and acquiring processes, converting them into connective-tissue corpuscles as elements of tissual repair from waste. Whatever be their origin as elements of tissue, they have three distinct varieties of forms upon the surfaces of the membranes to which they stand as marks of limitation, as they present themselves in serous, mucous, and sero-mucous surfaces.

Histologists give us three varieties of epithelial bodies. First, pavement epithelium, constituted of a single layer of flattened, nucleated bodies; second, columnar epithelium, in a stratum of elongated, compressed, closely-set, nucleated globules; and third, stratified epithelium, presenting a succession of layers of flattened bodies like pavement epithelium on the surface of a sub-imposed layer of compressed columnar epithelium, and this succeeded by a layer of less-compressed bodies of a like appearance, superimposed upon another layer of slightly-compressed globules, and this by a layer of globules merely touching each other, all with well-marked nuclei.

There is another marked difference of columnar epithelium, in which the cells are endowed with cilia, or vibratile prolongations, found in the deeper portions of mucous cavities, such as the stomach, nares, bronchi, and sexual organs.

The special point that I wish to call attention to in this paper is the vexed question of function and factor of function, as displayed in normal and vicarious examples of performance of function.

That which is nominated glandular function has usually been called secretory and excretory function. Secretory activity may be simply separatory in its character, or separatory and combinatory of the elements in pabulum between and within the cells. When such product is to be used for the incrematory processes of digestion, it is properly a secretion, whether that be a simple preparation of muscin, ptyalin, pepsin, pancreatin, or bilin. Any one or all of these constitute a secretion proper, although an excess of production of any may be rejected and excreted as unfit or not required for the preparation of normal pabulum, from which all the tissues of the system are supplied with the materials of growth and maintenance.

In the preparation of pabulum the incrematory process eliminates effete substances and excess of food material that must be disposed of for the well-being of the body; the unburned, unconcocted, or undigested portions are excreted through the *primæ viæ* of the digestory apparatus, but the salts that result from the incrematory rocess carried on in the interior of the motory and sensory appa- atus, are disposed of from the general circulation by excretory pro- esses displayed in the kidneys and so-called "sudoriparous and achrymal glands," and these may vicariously perform each other's unction, as witnessed by the increased secretion of urine in cold veather, and its diminished quantity in volume in warm weather, vhen the "sudoriparous glands" are excessively active. The point s, the difference of behavior of the apparatus under the variation of ircumstance.

As far as known, pavement epithelium, in whatever situation, ecretes only mucus in normal action; columnar and globular epithe- ium secrete a variety of solvents of digestible material; and ciliated pithelium facilitates, and sometimes instigates, the movement of the ontents of the cavity in which it occurs.

The question now arises as to the continuousness of the act of onverting pabulum into secretion. Do the cells act on their own motion, or at the instigation of special stimuli? The evidence of the latter is abundant, and to me convincing.

The proximate solvent nominated a peptogen is required to be present in the epithelium to enable it to draw pabulum from the djoining capillaries, at the demand of a food element that calls for a special combination, to effect its solution to meet the demands in the final product of pabulum.

For instance, take a quantity of dry starch into the mouth: the primary demand is lubrication, that it may be swallowed, to which he pavement epithelium responds by a supply of mucus; the sec- ndary demand is for ptyalin, to convert the starch into glucose; his demand is responded to by the epithelial bodies of the salivary glands.

Take the case of nitrogenous food, say a piece of muscle: in- roduce it into the mouth; it demands and receives lubrication by he process above named, and nothing further being here required, s swallowed, when it sets up a demand for a solvent to its nitro- genous body, which is responded to by a secretion of pepsin in a omplicated series of steps, reducing it to a pultaceous mass, in vhich state it makes its exit from the stomach through the pylorus, nd is disposed of by an absorption of its affete, and a precipitation f its effete portion.

Fat is not digested, it is simply emulsified, and its principal emul- ifier is evoked from the pancreas by the presence of the fat in the uodenum, after which it is taken up by the lacteals and distributed hroughout the circulation, to be consumed as a calorifient food, or ppropriated as starting-points of force-currents in the production f lymph-globules.

These currents of force are modes of energy set up and operated for the purpose of use in the body as a whole. That there is a demand and a response thereto occurring in the factors of function is an undoubted fact, but the intelligence of the demand, and the response by the epithelial bodies that operate the functions of secretion is still denied by all the physicists and physiologists, who assert that matter alone is sufficient to account for function.

Their mistake is in the assertion that matter can be *alone* by any possibility, and their failing to see that all the differentiations in matter are but the limitations of the energy, latent or active, that confer upon it all its differentiations, simple and complicated, of all the forms presented in it.

That the peptogenic corpuscles do exercise an election of choice to act or not to act, according to the demand made upon them, by dynamic or mechanical presence, may be proven by introducing beads of an insoluble nature (say quartz or agate beads) into the mouth and stomach, and then witnessing the results.

Mechanical pressure being sufficient to incite the lubricant, the epithelium pours out the requisite mucus, and the beads are readily swallowed. Upon their arrival in the stomach (being devoid of dynamic demand) they only incite further secretion, and pass around the cavity of the stomach after the manner of the bolus of food, and as soon as well coated with inspissated mucus they pass the pyloric valve and are ejected with the stool, without awakening any of the peptogenic globules of the epithelium to respond by the production of any of the various peptones allotted to them as their special work.

It will be seen that the various peptogenic globules responded to *legitimate* demand made upon them by mechanical and dynamic pressure, each in its order and true to its nature, producing or not producing according to the legitimacy or illegitimacy of the demand made upon the epithelial peptogenic corpuscles.

Every body possessing the demand of mechanical presence is responded to by the production of a lubricant; those bodies that add dynamic demand by their presence are responded to by the appropriate peptogenic corpuscles, whether they be located in the mouth, stomach, duodenum, intestine, or circulatory system of vessels, all acting when the co-tensions are attained that awaken the co-actions that reduce all the tensions of molecular metamorphoses into the quiescence of satisfaction in a perfectly elaborated pabulum or protoplasm.

It may be well to ask what constitutes the difference between these globules or cells that are called neutral cells, absorbent cells, and secretion cells.

Is it physical or dynamic endowment that enables the lining of vessels to retain their contents, the absorbent cells to absorb and carry gas or liquid to the point of demand, and the secretory cells to transform pabulum into mucus, saliva, gastric juice, pancreatic juice, and intestinal juice at the instigation of the requisite stimulus?

The limited time at command is not sufficient for the elaboration and demonstration of all the *rôles* of activity of the various forms of epithelial bodies with which we are already acquainted, if we desire to understand their origin, growth, development, and disappearance from the various sites in which we find them at work, for it involves so much of dogmatism and criticism to develop the truism, that we should be under the necessity of writing a whole chapter for each department, in statement, elucidation, and proof.

Let us, therefore, do what we may in the time at our disposal to awaken attention and direct earnest investigation of the subject before us.

Neutral cells are merely limitary bodies to inclose organs for special purposes. Absorbent and secretive cells are endowed with the power of obedience or disobedience of mandate coming in the shape of invitation, solicitation, or incitement to action.

The fermentative or peptogenic contents of secretive cells or corpuscles hold potential energy in manifold degree, so that one or more degrees of the energy may be called into activity, producing a peptone as a result of the demand in exact equivalence of the number of bonds awakened and engaged to form the peptone.

The complicated series of steps before referred to in the production of peptones or albumenoses, as serial steps to produce the *perfect* peptone (or endosmotic product of digestive activity), I will now succinctly nominate, to enable us the more successfully to grasp a confessedly difficult subject.

The conversion of albumen into the tolerably well-defined intermediate peptones, viz., dyspeptone, parapeptone, metapeptone, and finally the definite peptone, has been nominated porphyration, liquefaction, and change of color.

The dyspeptone is defined to be "the residuum of digestion of casein, insoluble and unassimilable. The characteristic of the parapeptone is, that it is precipitated by neutralizing its acid solution. The metapeptone, on the contrary, is precipitated by increasing the acidity of this product of the stomach, and definitively by concentrated mineral acids."

"These forms are transitory, and, as the digestion approaches its termination, they have a tendency to change into genuine peptones, with the exception of the dyspeptone, which remains in its former state, and of the parapeptone, which shows a tendency to change into the same," while the perfect peptone is characterized by its perfectly assimilable endosmotic nature, proved by its not appearing in the excretions when injected into the veins.

This is an interesting field of investigation, but too charming to be further pursued at present.

Epithelium, in its simplest form of a limitary or peripheral body, is of very low endowment of bonds of affinity, but so soon as a secondary or tertiary stratum of these bodies is formed, we find them endowed with more and more bonds capable of being called into activity; and we know of no case where the capability is exercised without the co-tension of dynamic presence.

All tooth-germs of "*calcified teeth*" have two strata of epithelial bodies, known as the enamel organ and dentinal organ. In the case of teeth that have no enamel, the epithelial cells of the enamel organ are not called into activity, and hence no enamel is deposited. In just so far as there is a demand for enamel in the completed tooth, in just that ratio is the cell action exercised, whether it be for the deposition of a mere tip of enamel on the point of the tooth (as in some eels) or any further deposit, even to the most complete investiture of the entire crown of the tooth, with great depth and strength of this adamantine structure, to fulfill the purpose for which it was evoked by the typal dynamic demand, as in the mammalia.

Ciliated epithelium is the highest form of development of epithelial bodies, the cilia themselves being the fruitage of this form of structure the divinest, most diffluent example of individual bodily presentment, and the analogue of neurine or nerve-aura, in which dynamic and psychic currents flow with least resistance.

The spermatozoids are but free cilia—whips, lashes, vibrioles—shed as products of epithelial cells from the inner walls of the "tubuli semeniferi," the bursting of whose periphery sets them free to seek their mutual saturation in bonds contained in the like bodies within the Graafian vesicles, which produces the fruitage of the body as a whole in a true germ or vivified ovum, the future enfoldings and duplications of the periphery of which evolves all the differentiations of systemic development.

These primary enfoldings are three in number, and are called embryonal sheets, viz.: neural sheet (serous-animal), glandular sheet (mucous-vegetable), and vascular sheet. Differentiations of these, and overlappings of these differentiations upon each other, constitute the fore-steps of evolution of the elements of the tissues that construct the machinery of respiration, innervation, circulation, digestion and locomotion.

To prove that functional activity depends upon a sort of necessity or demand, all that is required is to look into the early inception and progress of any manifestation of function of the machinery of which we are truly cognizant.

Metabolic or converting energy, in pabulum (or protoplasm), may be traced to the epithelial bodies that stand as factors of function, or at least channels of the modes of motion, that constitute the changes in physical and chemical character of the fluids and semi-fluids of the body.

Croup, diphtheria, and catarrh are examples of excessive activity of the epithelial bodies, that constitute the limit of the membranes from which these abnormal products exude. In these instances, the demands are abnormal or excessive, and the obedience of these bodies is also beyond the due measure, or there would be no false membranes formed or profluvia present.

The epithelial bodies within and without the organs are the points of startings and returns of impulses, that produce what is known as reflex nervous activity. Unusual excitation of the cilia of the epithelium of the "Schneiderian membrane" sets up a current in the respiratory tract of the nervous system, which explodes in a sneeze, of a violence commensurate with the energy of the titillation, the instant the circuit of the peripheric and central nodes is completed by the current.

The saliva and all the digestive juices are *provoked* by the setting up of currents of secretive energy in the various epithelia, by a reflex nervous action, in a similar way to that just reviewed.

At this point of the action of epithelia something takes place which is a little too fine to be accounted for on a merely physical basis. I refer to the psychic or mental impulse which is capable of setting up this reflex current, that is directed to any locality that the mind is in co-tension with, be its nodes secretive, excretive, affectional, or genital.

The teeth are "set on edge" by such sounds as set in a peculiar motion the lashes or cilia of the auditory apparatus; the feet are made to tingle and crawl at the sight of a person sliding on his feet down a dangerous incline. Words are the vehicle of poison and antidote. Misinterpretation of appearances or speeches may be either detrimental or conducive to the proper performance of function. Even harsh words from one regarded as a friend may heal, while the kindest words of a known or suspected foe injure, and may destroy.

In the case of excitation in a slight degree of the epithelial seta of the pituitary membrane, the disposition to sneeze is not sufficiently strong to close the current of action until a new impetus is attained; this is instinctively sought by a side-glance at the bright sun, so as to catch the full ray askance, by infringement upon the cornea of the eye; this adds to the titillation by a process not very clearly pointed out, beyond the fact of its frequent occurrence in producing the expiratory explosion. What the sun-presence does further than to produce this effect, and how it does it, is not yet demonstrated; but whatever its mode of action, it is similar to the effect of sensuous excitations of the various secretions and excretions.

An excitation of these same vibratile cilia of the nose often occurs upon sudden changes of the temperature of the inspired air. When one sneezes under such circumstances we say, "You are taking cold." A like reflex action attends upon placing the feet on a cold floor, pavement, or the ground, or suddenly plunging them into cold water without notification.

Just what the nervous connections are between the feet and the cilia of the "Schneiderian membrane" I do not certainly make out; but the fact I know, which admonishes me to avoid all such danger.

If the products of epithelium be, as is well known, the modifications of perfectly-digested pabulum in simple and complicated form, such as chitine, calco-globuline, calcospherite, or other example of secretive act, nevertheless they are all evoked by the typal dynamic demand, connected with intelligent use in shells, spines, horns, teeth, and the various glandular juices, elaborated by these epithelial bodies at dynamic behest.

Moleschott and Büchner, and later Cabanis, maintain that "thought is a *secretion* of the brain, just as bile is of the liver." This is the "materialization" of thought with a vengeance! This is an "elenchus" (sophism) of the materialistic physicists that forever prevents them from comprehending perfectly either function or factor of function.

To justify their assertion, they are bound to point out the personality and character of thought, as well as the form and character of the unitary body that elaborates it; just as we are able to give the formula of bile, and display to plainest sight the cell that converts pabulum into bile, as the justification of our assertion in the demonstration.

When we remember that the machinery of function consists of a series of elements that are continuously used up or destroyed in the production of the function, it will be clear to us that something different from the machinery itself must be present to produce the combination of these only *apparent factors* of function, which are the vehicles of energy.

In case combining energy be stopped off, the globules or functionary bodies cease to be produced out of the pabulum, or molecular mass of indifferent material, in which they are held in a potential or unpronounced condition.

We have a notable example of this in what is called hibernation, or torpidity, in the vegetable and animal kingdoms.

Hibernation arrests epithelial moulting by the retardation of the nutrient current of supply to the inner stratum of globules of the epithelium.

Claude Bernard has witnessed the disappearance of the pyloric glands in the frog during torpidity, and the renewal of these upon the awakening from hibernation.

What it is that is behind the slowing of the nutrient current the stopping of which results in the disappearance of the glands, and what it is that arouses or awakens this current that terminates the period of torpidity or hibernation, must wait further investigation and discovery, to enable us to satisfactorily demonstrate as more than a presentment or mode of motion.

That the nutrient currents are diminished, if not arrested, is clearly proven by observations made upon the North American black bear, and other hibernating animals, coming out of their state of torpidity without appreciable loss of weight.

Periods of hibernation seem to be under the dominion of climate, being commensurate with the length of winter belonging to the latitude. There is also in the vegetable kingdom a like principle displayed, of which climate seems to be the exponent, as instanced in the oaks of the torrid zone, being evergreens, becoming deciduous in the temperate and south part of the frigid zones of the North latitudes.

Dr. J. B. Rich. Mr. President, I do not propose to discuss this paper. It is full of ideas that are entirely new to those who are acquainted with what little is really known about epithelium, and this paper presents some rather startling propositions on that subject. But I would like to have an explanation of the exact meaning of the term Dr. Atkinson used, "vacuoles," which he informs us are particles of finely-divided oil or fat, produced by emulsion in the pancreatic juice, being the starting-point of the blood-globule. That was entirely new to me, and I would like to ask the doctor's authority for that statement.

Dr. Atkinson. Direct observation.

Dr. Rich. We would like to know the experiments.

Dr. Atkinson. I will try to answer that question briefly.

I shall not say it is anything more than my opinion, although it may be my knowledge. I say it is my opinion, as I said in 1859 that it was my opinion that the blood-globules escape from the capillary vessels, and I then had the credit of being called crazy; but, thank God! some of the most eminent men of the present day are now crazy the same way. My assertion in the paper is, that fat is not digested, but is emulsified, and its emulsifier is the pancreatine that is prepared by the epithelial cells of the pancreas.

All cells that escape from the lining membranes (the epithelial lining of the lymph tract,—so-called "blood-glands") first have what are called vacuoles within them. They are not vacuoles at all, but infinitely fine drops of fat that had gathered some mucous matter about them,—a peculiar kind of albuminose that have a pellicle on the outside of them,—and thus starting, the globules finally enlarge sufficiently to be shed into the lymph tract, taken up by the absorbents, and carried through the system. These may be seen in the egg of the common barn fowl.

Now these have not been traced individually through the tract until they passed into the lungs, and became changed there into real red blood-corpuscles, endowed with cruorin, which holds such an affinity for oxygen as to make them fine oxygen-carriers to the system. I have repeatedly said, and I stand nearly alone in the proposition, that the blood-corpuscles are the seed-bodies of the tissues. There is one other source whence tissues find the elements of their production, and that is fibrillations of coagulable lymph; and when we get a knowledge of the difference between pure pabulum and the different grades through which it passes with blood-corpuscles, and then the further change into tissue, we will be able to differentiate between what are called living and dead tissues. What is nominated the change from nutrient or living material to formed or dead material is difficult to state, but we have caught it in a great many of its stages. We cannot follow an individual corpuscle throughout the entire circulation. We are in doubt as to the spleen, but we think it fair to assume that the spleen is not a burial-place but a birth-place of corpuscles, as all the rest of the blood-glands are.

Dr. C. A. Kingsbury. I desire to ask Dr. Atkinson if he wishes us to understand that during the hibernation of the bear there is no loss of weight.

Dr. W. H. Atkinson. Absolutely yes, and the proofs are at hand.

Dr. C. A. Kingsbury. I think that is an error. It is generally understood that when the bear goes into a state of hibernation in the fall it is in a fat condition, and when it comes out it is usually poor, and it is generally understood that it is by the consumption or combustion of carbon that the vital heat is kept up. This must be attended by loss of weight.

Dr. W. H. Atkinson. The fact I have stated has been well ascertained, and the term "spring poor" is derived from the farm, where poorly-fed cattle are said to come out "spring poor." Experiments have been made; bears have been weighed upon going into a state of hibernation and upon coming out, and have been found to be full weight in the spring. I know of one instance where two bears nearly equal in weight were weighed upon going into hibernation. In February, one of them before coming out was induced to eat, and it killed it. The other slept on and came out all "right" in the spring, and full weight.

(To be continued.)

OHIO COLLEGE OF DENTAL SURGERY.

The thirty-second annual commencement of the Ohio College of Dental Surgery was held in the lecture hall of the college, Cincinnati, Wednesday evening, March 6th, 1878.

The annual address was delivered by Dr. A. O. Rawls, of Lexington, Ky.; the reply on behalf of the class by Dr. T. A. Stephenson. An address was also delivered by the president of the board of trustees.

The degree of D.D.S. was conferred upon the following graduates by the president:

Charles H. Rosenthal, Indiana; William H. Creighton, Ohio; M. P. Walsh, Illinois; Thomas A. Stephenson, Ohio; Charles N. Fithian, Kentucky; W. D. Phillips, Ohio.

DENTAL DEPARTMENT, UNIVERSITY OF MICHIGAN.

The third annual commencement of the Dental College of the University of Michigan was held on Wednesday, March 27th, 1878, in the hall of the university, when the degree of Doctor of Dental Surgery was conferred upon the following-named graduates:

NAME.	RESIDENCE.	NAME.	RESIDENCE.
Edwin E. Arnold	Mich.	J. B. McGregor	Mich.
John N. Cowan	"	B. F. Miller	"
Thomas S. Ewing	"	W. H. Miller	Ohio.
Sherman F. Fitch	"	Wm. Mitchell	"
Mark F. Finley	"	Eben L. Parker	Mich.
Alvin Knapp	Ind.	Chas. W. Sanderson	N. Y.
Fremont E. Lyon	Ohio.	Geo. H. Wilson	Ohio.

The annual address was delivered by Dr. Geo. L. Field, of Detroit.

ALUMNI ASSOCIATION OF THE BOSTON DENTAL COLLEGE.

At the seventh annual meeting of the Alumni Association of the Boston Dental College, held March 6th, 1878, the following officers were elected for the coming year:

President.—Dr. C. M. Murphy, Dover, N. H.

Vice-Presidents.—Dr. D. W. Edgerly, Farmington, N. H.; Dr. Leon Rideout, Lynn, Mass.

Secretary.—Dr. H. W. Coburn, Lowell, Mass.

Treasurer.—Dr. C. H. Osgood, Boston, Mass.

H. W. Coburn, *Secretary.*

KANSAS STATE DENTAL ASSOCIATION.

The Kansas Dental Association will meet at Lawrence, Kansas, May 7th, 1878. William H. Shulze, *Secretary.*

ILLINOIS STATE DENTAL SOCIETY.

The fourteenth annual meeting of the Illinois State Dental Society will commence May 14th, at Rockford, Ill., at ten o'clock A.M.

An effort is being made to make this one of the most interesting and instructive sessions the society has ever held.

Edgar D. Swain, *Secretary.*

EASTERN INDIANA DENTAL ASSOCIATION.

The semi-annual meeting of the Eastern Indiana Dental Association will be held in Knightstown, Henry County, Indiana, commencing Tuesday, May 14th, 1878, at ten o'clock A.M., and continuing two days.

The executive committee would respectfully request a full attendance of the members.

A cordial invitation is extended to all in the profession to attend these meetings. J. K. Jameson, *Secretary.*

MERRIMACK VALLEY DENTAL ASSOCIATION.

The fifteenth semi-annual meeting of the Merrimack Valley Dental Association will be held at Tremont House, Boston, Massachusetts, Thursday and Friday, May 16th and 17th, 1878, commencing at eleven A.M. on Thursday.

Subject for discussion, "The New Departure."

All respectable members of the dental profession are invited to be present, and join the association. W. E. Riggs, *Secretary.*

CALIFORNIA STATE DENTAL ASSOCIATION.

The ninth annual session of the California State Dental Association will be held in San Francisco, commencing Tuesday, June 4th, 1878, at ten o'clock A.M., and continue three days.

All members are respectfully invited to present volunteer essays on any subject pertaining to the profession which they may select.

H. J. Plomteaux, *Secretary.*

MISSOURI STATE DENTAL ASSOCIATION.

The fourteenth annual session of the Missouri State Dental Association will be held at Sweet Springs, Mo., commencing June 4th, 1878, at ten o'clock A.M., and continue four days.

W. H. Eames, *Secretary.*

IOWA STATE DENTAL SOCIETY.

The Iowa State Dental Society will meet at Iowa City, on Tuesday, July 9th, 1878. I. P. Wilson, *Secretary.*

NEBRASKA STATE DENTAL SOCIETY.

The annual meeting of the Nebraska State Dental Society will be held at Fremont, commencing Tuesday, July 23d, 1878.

W. F. Roseman, *Secretary and Treasurer.*

EDITORIAL.

THE DENTAL DEPARTMENT OF THE UNIVERSITY.

The creation of a Dental Department in that time-honored institution, the University of Pennsylvania, was an event not altogether unexpected, the matter having been under discussion from time to time for several years past. The expectation had become general that, whenever the proposed enterprise should be inaugurated, it would be on the basis of a general medical education, such as would entitle graduates to the degree of Doctor of Medicine, with special facilities afforded to those who desired to practice dentistry as a specialty of medicine, and the granting of a certificate of qualification after passing a satisfactory examination therein. It is not to be disguised that disappointment was felt by many who had hoped to see such expectations realized in the University plan, when the announcement was made of the intention of the trustees to institute a different curriculum for dental students, and to perpetuate a "partial" degree.

To say that the degree D.D.S. is a partial degree is not to depreciate the value of the teaching a familiarity with which is essential to its possession, but it is not, and will not be accepted as indicating that fullness of education which makes the practitioner of dentistry a specialist in medicine.

To deny the advantages which such education as well as such recognition would confer, not alone on the individual, but on the specialty, were idle. The practice of aural or of ophthalmic surgery on any other basis than that of a general medical education and the possession of the common degree, would not have commanded the confidence either of the medical profession or of the public to the extent which it now does, and it may as safely be affirmed that as specialties they would not have advanced so rapidly.

Thoughtful men have observed that a hiatus exists between the qualifications of dentists (as a class) on the one hand, and of physicians on the other,—the result of partial training on either side,—and that the institutions which have given the respective qualifications have equally failed to bridge the chasm. The doctor has graduated, knowing nothing of the lesions of the mouth, while the dentist has not been sufficiently educated, medically and surgically, to qualify him for practice as a medical and surgical specialist.

We believe that dentistry is worthy of a position as a medical specialty, and that the knowledge and skill required for its highest practice are no less than are required in any other specialty of the healing art, though we are willing to admit that many of its practitioners have attained that knowledge and skill without graduating from a medical college. A medical graduate without special training is, however, wholly incompetent to practice dentistry. Special training is necessary to qualify a graduate for the successful practice of any specialty, and there is more that is peculiar in dentistry than in either of the recognized specialties, and therefore more special training is required, to prepare for its practice.

The University authorities recognize all that we claim when in their announcement of the institution of a dental department they say, "So many new methods and theories are embraced in its successful practice that nothing but the broadest and most thorough training in the collateral sciences will enable its members to practice it intelligently and successfully." With such convictions it seems strange that they should have decided to narrow the training and narrow the degree to correspond. The only explanation possible is that they have sacrificed consistency to expediency, doing not what they believed ought to be done, but that which promised more speedy returns. It is true they recognize the propriety of considering dentistry a specialty of medicine, and have arranged a curriculum which will enable the student to obtain both degrees by taking three courses. It is equally true that they offer him the opportunity of the partial degree after two courses. It is only fair to state that they claim a distinct advance in requiring five months' study instead of four in each course, and greater facilities and more thorough practical training in chemistry and metallurgy; but these are matters about which those who desire information as to the relative advantages of this department over the dental colleges proper can inform themselves by a careful study and comparison of their announcement with those of the different schools, all of which we recommend those proposing to study dentistry to procure.

So far as the making of dentists is concerned, the practice of dentistry being what it has usually been considered, the dental colleges, it would seem, were sufficient, and there was no necessity for opposition. The need, if it existed, was in the direction of a more thorough medical and surgical training, such as would have helped to lift the practice of dentistry to a higher plane and to a more secure position as a recognized specialty in the great circle of medical science; such as would have given to graduates of the new school the advantage which those who know a subject in all its associations have over those who have studied only a part.

Of one thing we are assured, the dentistry of the future is to be something more, not less, than is included in the ordinary curriculum of the medical schools,—something added, precisely as ophthalmic or aural surgery express the same general foundation and superstructure with a story added.

In all that we have written no word must be interpreted to express less than the highest respect for the labors of those who have been and are engaged in the work of the dental colleges, for the unquestioned advances which have been made by these institutions, or for the qualifications represented by the degree which they confer.

Our criticism of the University plan is that the importance of the hiatus to which we have alluded has not been appreciated. The position we take is, that the lesions of the mouth are sufficiently serious and of such special character as to justify their teaching, study, and treatment as a special branch of medical practice,—a position which the University authorities seem not to have accepted in arranging for a partial training and a partial degree.

In conclusion, we hope that the increased competition will result in a steady advance of the educational standard, and in a better preparation for the practice which is indicated by the special degree.

Meanwhile, we trust the time is not far distant when partial culture and partial degrees shall give place to a common culture and a common degree, on which as a basis those drawn by interest or inclination to the particular study and treatment of oral lesions will build a specialty which shall deserve and command the recognition due to special knowledge and skill,—mechanical and artistic skill, and medical and surgical knowledge, experience and proficiency.

DEATH DURING ANÆSTHESIA.

Another addition to the list of fatalities attending the administration of chloroform occurred in this city on the 20th of March last. The operator was Dr. H. G. Winslow, No. 224 North Tenth Street. Dr. Winslow graduated as a doctor of medicine from the Jefferson Medical College in 1841, and has since that time been engaged chiefly in the practice of medicine. Owing to the fact that he has frequently been employed by surgeons to administer chloroform, and was known to administer it in obstetric cases in his own practice, he had come to be regarded as trustworthy in its employment, and had gradually acquired a reputation in that direction which brought many to his office who desired anæsthesia during the extraction of teeth.

The patient was Mrs. Elizabeth Neely, of Hatboro', Pennsylvania, about thirty-five years of age.

At the coroner's inquest Dr. Winslow testified that he had been in the habit of administering chloroform for thirty years, and had never had a fatal case or any serious trouble from its employment previously. He had asked the patient if she felt well. She replied in the affirmative. He placed her in a reclining position and administered chloroform from a napkin for about two minutes, and then extracted three teeth. Noticing that the patient was recovering consciousness, he again applied the napkin with more chloroform,—giving in all about half an ounce,—and proceeded to extract another tooth, which was broken in the effort. He then noticed that the patient had ceased breathing, and, applying his fingers to the pulse, found that the heart had ceased acting. Attempts were made to restore animation but without result,—the patient was dead.

The coroner's physician testified to having made a post-mortem examination of deceased, finding evidence of heart-disease, which might have caused death at any time, though not sufficient to have resulted fatally at once necessarily. The jury rendered a verdict that the deceased came to her death as the result of the administration of chloroform, and found Dr. Winslow guilty of criminal ignorance in administering so powerful a remedy, not having previously made an examination of his patient. Dr. Winslow was then held in five thousand dollars' bail to await the action of the grand jury.

Such, in brief, is the history of the unfortunate case which has furnished a text to the newspapers upon which to comment about the ignorance and carelessness of dentists, the dangers of chloroform, and the absolute safety of ether and nitrous oxide gas. The coroner, who is a practitioner of medicine, performed what he termed his solemn duty of censuring Dr. Winslow for the use of so dangerous an agent as chloroform when he had at his command a much safer substitute in ether, and a perfectly harmless one in nitrous oxide gas.

The coroner's jury doubtless went beyond their province in deciding upon the question of *guilt*. The coroner had no right to pronounce *judgment* in the case, and had certainly no justification for declaring in such broad terms that nitrous oxide gas was *perfectly safe*. The newspapers which assumed, because the mischief occurred during anæsthesia produced for the purpose of tooth-extraction, that the operator was a dentist, and indulged in lectures about the necessity for the presence of a medical man when chloroform is administered, displayed their ignorance alike of the facts and of the dangers not only of chloroform but of all general anæsthetics when either a special idiosyncrasy or certain pathological conditions (not always to be determined absolutely beforehand) are encountered.

The lesson of this catastrophe is caution; and the problem which it once more suggests is, If general anæsthesia is justifiable ordinarily for the extraction of teeth?

INDEPENDENT JOURNALISM AGAIN.

There are four classes of persons with whom it is neither desirable nor profitable to enter into discussion, viz., those who are incapable of understanding an argument; those who wilfully pervert or distort statements in order to make a point; those who cannot discuss a fact or a proposition without resorting to personal abuse; and those who expect to be bribed to keep the peace.

In the December number of the Dental Cosmos we objected, in a dispassionate article, to the claim to an exclusive independence on the part of the *Canada Journal*, and argued that a journal is not necessarily free from bias *because* its publisher is a dentist, any more than one published by a manufacturer or dealer is *therefore* inevitably biased.

The *Canada Journal*, replying thereto, reasserts its claim to be "the only independent dental journal on the continent," and avails itself of that opportunity to accuse the publisher of the Dental Cosmos of dishonorable conduct in matters about which it is either ignorant or untruthful.

Our remarks that the puffs which occasionally adorn the pages of so-called independent journals may sometimes be the result of influence, and be paid for, directly or indirectly, it styles a "silly insinuation." We did not mean to *insinuate* anything, but to express an opinion, and in explanation we submit the following extract from a letter received by the publisher of this journal from the proprietor and editor of the *Canada Journal of Dental Science:*

> "I will be happy to give liberal editorial notice to any articles you feel inclined at any time to favor me with.
>
> "W. George Beers."

He was not favored with any articles, but has, nevertheless, given us a liberal editorial notice,—five pages.

We dislike personalities in journalism, but esteem it a duty to expose the black-mail spirit, whenever or wherever manifested.

We take leave of the *Canada Journal* until it shall learn that impudence and misrepresentation do not constitute independence.

BIBLIOGRAPHICAL.

The Advantages and Accidents of Artificial Anæsthesia. Being a Manual of Anæsthetic Agents, and their Modes of Administration. By Laurence Turnbull, M.D., Ph.G. With twenty-five illustrations. 12mo, pp. 208. Philadelphia: Lindsay & Blakiston, 1878.

The want of a convenient hand-book of a practical character on the administration of the various anæsthetics employed in medicine has been felt for several years. The object of the volume before us was to supply that want; to give a concise description of the different agents, their composition, physical characters, medical properties, and tests of purity; to indicate the best methods of administration, precautions to be observed, the most improved inhalers, etc.

The object thus set forth has been fairly accomplished, though not as systematically as might have been done. The book contains, however, a larger amount of and more definite information about the production of general anæsthesia by different agents and methods than any other volume which has been published, and will certainly prove a valuable reference on many important and practical points connected with the subject treated. The relative mortality from the different anæsthetics is compared, and an honest effort made to assist the reader in forming an opinion upon their comparative advantages and disadvantages. Some practical information is appended on local anæsthesia, and on the therapeutic use of the several anæsthetics in the practice of medicine, and upon the general medico-legal relations of anæsthetics.

The volume should not only find a place in the library of every practitioner who administers anæsthetics, but many of its facts, cautions, and directions should be carefully pondered and remembered. When trouble comes to a patient from any cause, during the anæsthetic state, it is not a good time to hunt up information.

OBITUARY.

CHAS. A. DU BOUCHET, M.D., D.D.S.

Died, March 12th, 1878, at his residence, Rue de la Faisanderie 27, Passy, Paris, Chas. A. Du Bouchet, M.D., D.D.S., of Philadelphia, aged fifty-nine years.

He enjoyed for many years the practice and confidence of a large clientèle in Philadelphia, and for the past eleven years in Paris. He was one of the founders of the first chartered Dental School of Philadelphia, was a member of the Odontographic Society of Philadelphia, of the Odontological Society of New York, of the "Société d' Encouragement" in France, formerly a member of the French Benevolent Society of Philadelphia, of the American Charitable Association of Paris, of the Society of American Dentists in Europe, and Chevalier of the Order of Isabel the Catholic.

Dr. Du Bouchet was respected and beloved as an upright man by all who knew him. He leaves a widow, three sons, and many friends to mourn his loss.

THE LATE DR. G. J. BARCLAY.

At a meeting of the faculty of the Maryland Dental College, held February 2d, 1878, a preamble and resolutions were unanimously adopted expressing their high appreciation of Dr. Barclay as a man and as an operator, and their sense of loss in his death.

PERISCOPE.

The Embryological Relationship of the Post-oral Region.—". . . There is perhaps no part of the history of development in the vertebrates which illustrates in a more striking manner the similarity of plan which runs through the whole of them than that connected with what I may loosely call the region of the face and neck, including the apparatus of the jaws and gills. The embryonic parts I now refer to consist of a series of symmetrical pairs of plates which are developed at an early period below the cranium, and may therefore, in strictly embryological terms, be styled the *subcranial plates.*

"Without attempting to follow out the remarkable changes which occur in the development of the nose and mouth in connection with the anterior set of these plates, which, from being placed before the mouth, are sometimes named *pre-oral*, I may here refer shortly to the history of the plates situated behind the mouth, which were discovered by Roth in 1826, and formed the subject of an elaborate investigation by Reichert in 1837.

"These plates consist of a series of symmetrical bars—four in number in mammals and birds—placed immediately behind the mouth, separated by clefts passing through the wall of the throat, and each traversed by a division of the great artery from the heart; thus constituting the type of bronchial apparatus which in fishes and amphibia becomes converted into the well-known gills of these animals, whilst in reptiles, birds, and mammals they undergo various changes leading to the formation of very different parts, which could not be recognized as having any relation to gill structure but for the observation of their earlier embryonic condition. The history of this part of development also possesses great interest on account of the extraordinary degree of general resemblance which it gives to the embryos of the most different animals at certain stages of advancement; so great, indeed, that it requires a practiced eye to distinguish between the embryos of very different orders of mammals, and even between some of them and the embryos of birds and reptiles, as well as in connection with the transformations of the first pair of bronchial apertures, which lead to the formation of the passage from the throat to the ear in the higher vertebrata. There is equal interest attached to the history of the development of the first pair of arches which include the basis of formation of the lower jaw with the so-called *cartilage of Meckel*, and which, while furnishing the bone which suspends the lower jaw in reptiles and birds, is converted in mammals into the hammer-bone of the ear.

"The other arches undergo transformations which are hardly less marvelous, and the whole series of changes is such as never fails to impress the embryological inquirer with a forcible idea of the persistence of type and the inexhaustible variety of changes to which simple and fundamental parts may be subject in the process of development.

"It is also of deep significance, in connection with the foregoing phenomena, to observe the increase in the number of the gill-bars and apertures as we descend in the scale to the cartilaginous fishes and lampreys, and the still further multiplication of these metameses or repeated parts in the amphyoxus; and it is, perhaps, also interesting to note that in the ascidia the arrangement of the gills is exactly similar to that of the amphyoxus. . . ."—*Extract from Prof. Allen Thomson's address before the British Science Association at Plymouth meeting*, 1877. *From Nature.*

Amyl-Nitrite.—Chloroformed kittens after breathing a few drops of amyl-nitrite awake very quickly out of the narcosis, whereas large doses—twenty drops and more—result speedily in death. A patient who had fallen into threatening syncope through the use of chloroform and whom many remedies had failed to resuscitate, was restored to life almost at the moment of death by means of a few drops of the amyl-nitrite poured on a piece of linen and held under the nose.—*Correspondenz-Blatt für Zahnarzte.* A. B. C.

Removal of Unpleasant Odors from the Hands.—The ungracious odor which is so frequently found to attach itself to the hands and instruments of the dentist is to be removed, according to Herr F. Schneider, by the use of powdered mustard mixed with water. Vessels are readily made clean by the same means.

The same virtue is claimed by A. Huber for the powder of all the oil-seeds. Dampened flaxseed meal, he says, will remove instantly from the fingers the smell of carbolic acid.—"*Schweizerischen Wochenschrift für Pharmacie.*" A. B. C.

Dental Monstrosities.—The Russian traveler, M. Wikluche, calls attention to a remarkable peculiarity in the teeth of the de l'Amirante et de l'Ermite. The superior incisor advances, shovel-like, almost horizontally, extending from between the lips quite two-thirds of an inch when the mouth is closed. As all the natives chew betel-nuts, the organs have a black polish which does not, as is to be inferred, add to the sightliness. In Malacca it appears the same anatomical peculiarity is to be found among certain of the inhabitants. The race so distinguished are known in the country by the name d'Orang-Gargassi.—*Abstract from "Le Progrès Dentaire,"* by A. B. C.

HINTS AND QUERIES.

"He that questioneth much shall learn much."—Bacon.

Correspondents desiring a reply in this department are requested to make use of *distinctive signatures or initials*, and avoid the practice of signing their communications Reader, Subscriber, etc.

Correspondents who wish notice to be taken of their communications should authenticate them with their names. We cannot insert queries or replies except they are so accompanied. Names not necessarily for publication.

"No medical fallacy, from the earliest times to the present, has prevailed which has not been able to summon an ample clinical experience in its support. Nothing so preposterous or incredible, the value of which has not been apparently clinically demonstrated, and in proof of which unlimited certificates may not be marshaled. Empiricism and rationalism must be mutually corrective, if true progress and reliable inductions are to be made."

Will some one, who knows certainly, state who is entitled to the credit of first using the mallet in filling teeth?—W. M.

Other things being equal, which teeth, having filled cavities, will be liable to decay more rapidly, *live or pulpless* teeth?—V. T.

Will not some one give us *general principles* and a rule or rules of practice to be relied upon in the treatment of Riggs's disease?—I. L.

Will some one please inform me how to prevent teeth from elongating,—that is, being driven into the plaster when celluloid is used in packing?—M. B.

Has a doctor of dental surgery a legal right to administer an anæsthetic?
—W. C. M.

I was called upon the other day to fill some teeth for a lady apparently about eighteen or nineteen years of age. There is a discoloration on the cutting-edges of the central incisors, running crosswise about one and one-half lines wide, almost the color of gold. It does not appear to reach the dentine. It appeared about two years ago. She says that it was not caused by medicines. Her health has always been good. Will some one explain the cause?—H. C. W.

Reply to H. C. H.—I never consider a necrosed tooth ready to fill while there is any fetor—be it never so slight—in the root. I have never seen a case of devitalized pulp from disease, no matter of how long standing, where there was not fetor. In cases where I cannot introduce a broach, I drill a spear-pointed cavity in the direction of the nerve-canal, or, after removing all *débris*, I force carbolic acid into the root, and let it stand a week, repeating, if necessary, until it is perfectly disinfected. I then force a thin solution of gutta-percha and chloroform into the roots in the same manner as the carbolic acid, and let stand a few days before I fill the crown.—V. L. B.

Answer to I. P. W., in February Dental Cosmos, who states the case of a young man, twenty-one years old, who has irregular incisors, and wishes to know if his patient is too old to have them regulated successfully. About six months ago a young lady, twenty-nine years of age, came to me with her upper central incisors nearly a quarter of an inch apart, the laterals never having erupted. It not only disfigured her, but made a defect in her speech. She had consulted eminent dentists in New York City and elsewhere to see if they could be regulated, but she was told that they could not be, and so she desired to have them extracted. This would not have been good practice, as they were perfectly sound. I placed rubber tubing around the central incisors, and also around one of the cuspids and bicuspids. By so doing I forced the centrals completely together, making room for the insertion of a right lateral incisor on a celluloid plate. Her face now presents a much handsomer appearance, and the space between the left central and cuspid is not one-sixteenth of an inch. With the experience which I have, I should say that I. P. W.'s patient is not too old. After the teeth are in place, they ought to be so held for one year or more.—GEO. A. RAYMOND, *North Cambridge, Mass.*

THE question has been asked several times lately, how to prevent the dark lines showing at the junction of gum (rubber) teeth. In the DENTAL COSMOS for June, 1872, page 322 (vol. xiv.), I gave what I still believe to be the only reliable method of preventing this disfigurement. As some who ask this question may not have the DENTAL COSMOS for 1872, I will repeat these directions.

First grind the joints so they touch *inside* as well as outside (this will prevent chipping or cracking of the enamel while vulcanizing); then, on the inside of each block, grind away a very small portion, so as to leave a sort of gutter or groove, V-shaped, the whole length of the joint. After the flask has been taken apart and all wax removed, take a piece of white thread (of ordinary thickness) and pack in the aforesaid groove, letting the ends be about three-eighths of an inch longer than the joint, then carefully press (with an excavator) these ends between the gum and the plaster, in a solid wad, directly over and at each end of the joint, *in the plaster;* then pack and vulcanize; the ends can be easily cut off afterwards. I have used this method successfully for five years (*eleven now*) without a failure, and, if properly manipulated, it can hardly be detected from continuous gum.—VREDENBURGH.

APPLICATION OF THE RUBBER DAM MADE EASY.—Having derived great benefit from a very simple method of applying the dam, which occurred to me several years since, I take pleasure in laying it before the readers of the DENTAL COSMOS.

The idea still prevails with many that it requires less time, and is far less trouble to fill small cavities with the assistance of the napkin, than with that of the dam. This would be quite true if it were necessary to force the dam between teeth which are tightly crowded, but this is not so.

To illustrate: suppose a cavity in either the lingual, buccal, or grinding surface of a lower molar tooth, take a piece of rubber six by eight inches square, or sufficiently large to fully apron the mouth, place the narrow edge midway, directly under the nose, and retain it in that position with the left hand; direct the patient to open the mouth, and, with the index-finger of the right, carry the rubber into the mouth until the finger comes in contact with the tooth to be filled; grasp the dam with the finger and thumb at that point, and punch a hole the desired size.

Having selected the proper clamp, slip the jaws well through the hole in the dam, and place the clamp-forceps in position; fold the dam around them so as not to obstruct the vision, and apply the clamp to the tooth; attach the Cogswell holder, and, with a right-angle burnisher or other smooth instrument, slip the dam below the jaws of the clamp. The dam is now in place, stretching *over the crowns* of the teeth, and not passing between them, nor is it necessary that it should.

This method may be used advantageously in filling approximate cavities also, it being only necessary to place the clamp on the farther tooth first, and then, with the instrument in the other aperture of the dam, carry it over the adjoining tooth. Of course in such cases it becomes necessary to pass the dam between the teeth and below the cavity or cavities to be filled, which may be easily accomplished after having obtained the requisite space by wedging, unless the cavities extend below the free margin of the gum, in which case no particular rule can be followed.

The practice of forcing the dam over, and ligating four or five teeth for the purpose of filling a simple cavity, I regard as not only useless, but extremely barbarous; and, were I the patient in hand, would much prefer the napkin used.

If the holes in the dam be made of the proper size—that is, small enough to grasp the necks of the teeth tightly, and at a proper distance from each other, so that little or no tension is produced on that portion of the dam bridging the gum between the teeth—ligatures need seldom be used.

Every operator who has used the dam at all knows how tenaciously it will cling to the necks of the teeth when it becomes necessary to remove it; showing conclusively that vastly more dependence may be placed on it than is usually allowed.

I have constantly on my cabinet two articles that I regard as indispensable,—carbolic acid and alcohol. To remove thoroughly and quickly the moisture, after dressing with the acid,—supposing the dam already in position,—I apply the alcohol, which is a ready solvent of both acid and mucus. I now remove as much as possible with Japanese bibulous paper, and then dry thoroughly and quickly with warm air from the syringe, and proceed at once to fill.

Those adopting this method will observe one fact, and that is, that it is just as convenient to attach both dam and clamp at once as it is to attach the clamp alone; thus making it possible and easy to dam any tooth without an assistant, or any great inconvenience to either patient or operator.—S. F. HAM, D.M.D., *Boston, Mass.*

RULES FOR SECURING REGULAR DENTURES.—Dr. G. Von Langsdorff has a paper of several pages in the *Vierteljahrsschrift* in which he takes occasion to object to the view, as taught in "Garretson's System of Oral Surgery," and entertained generally by American practitioners, that a too early removal of the milk-teeth favors irregularity in the second set. Dr. Langsdorff sides with Gross and Tomes, who are referred to by Dr. Garretson in his work as objecting to the view. The attempt of the essay is to exhibit that the extraction of the deciduous teeth cannot lessen the expansion of the jaw-bone; a position in which, had he read the American's work more closely, he would have recognized himself entirely agreed with. Dr. Garretson is particular in the assertion that it is the alveolar process alone which has its development interfered with by an undue disturbance of the primary dental arch. It is upon the character of the process, not upon that of the base-bone, that irregularities depend.—A. B. C.

THE NEW DEPARTURE.—"Le Progrès Dentaire" introduces the paper lately read by Dr. Flagg before the Odontological Society of New York, with the following comments: "At a glance it is to be recognized that the expressions of Dr. Flagg are extravagant and exaggerated, yet in despite of his eccentricities, Dr. Flagg has rendered during his life such eminent services to his profession that all words which go out of his mouth command respect. In affording the French reader an opportunity to become familiar with the teachings of the Philadelphia professor, we are not to be understood as either indorsing or denying anything that appears in the paper. This explanation seems necessary, from the fact that many readers of a journal suppose that the printed pages represent the views of its editor. The present paper has been sent to us by one of the most eminent members of the profession in the United States. We print it as received."—A. B. C.

THE EMPLOYMENT OF SALICYLIC ACID IN DENTAL SURGERY.—At a late meeting of the Schleswig-Holstein Dental Society, reported in the *Deutsche Vierteljahrsschrift für Zahnheilkunde*, the following views were elicited concerning this comparatively new agent:

Herr Gehrke advocates its use in mouth-washes. Herr Zader held as an opposite experience that it is not to be so employed. Herr Kleinman infers from his experience that it acts injuriously on tooth-bone, although but little upon the enamel. Herr Wiermann believes that the acid finds its way quickly through the fissures of the enamel.

The question was asked by Dr. Arend, whether observation had elicited the constant association of ill consequences in the mouth with the use of this acid.

Herr Buschendorf could vouch for such ill influences, as far as the necks of the teeth are concerned. Herr Elners had witnessed the association of pain as expressive of its irritating quality when applied to tooth-bone and the dental neck. Herr Kleinman held it as a matter decided that the agent was corrosive to the teeth.

The views of the society were requested by Herr Buschendorf as to the influence of its application to exposed and sensitive pulps. Answer was made by Herr Schmidt that he had had no reaction. Herr Fricke also had found no benefit from the application.—A. B. C.

TOOTH-TUGGERS.—Only a little more than a year back the dental profession was thrown into a state of considerable commotion and disgust by an effort on the part of the Philadelphia *Medical Times* to point out what that journal considered the disparity existing between its pretensions and performances. The Philadelphia *Times* newspaper, in its morning issue of February 28th, captions the notice of the commencement of the Philadelphia Dental College with the title of the present paragraphs.

Once upon a time the sign of the bleeder and leecher announced "Barber"; after a time a word was added, and the sign said "Barber-Surgeon"; still later there was another change, and the sign read simply "———, M.D."

We would say to our friends of the press, medical and lay, All in good time, gentlemen; have a little patience. None better than some of ourselves understand the mistake of having assumed a "Doctorate" before being ready to perform doctors' duties. A little while yet, however, the mass of us must rest content at our inability to tug in a wider sphere than is comprised by the dental arch. Wait a decade. You will at least accord to us the credit even now of being energetic workers. Wait only a decade, and see what you will then find us "tugging" at. Believe that consciousness is alive to the conviction that the dentist must go either forwards or backwards. We do not believe that he will be found going backwards. Already the sign is seen to be undergoing a change. Twenty years ago a dentist, now a prominent professor, asked in an assembly of the fraternity, "What has a dentist to do with alveolar abscess?" To-day there are dentists who practice upon the conviction and principle that the whole range of oral surgery is the legitimate dominion of this specialist. The dentist's sign, gentlemen editors, is a palimpsest; look closely, and you can see the old word "Barber." The new word you will see in a decade,—that is, you will see it, or otherwise you will see a specialty that has been outgrown by the intelligence of its age. In a decade you and we will be agreed.—A LOOKER-ON.

THE

DENTAL COSMOS.

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ORIGINAL COMMUNICATIONS.

DENTAL PATHOLOGY AND THERAPEUTICS.

BY J. FOSTER FLAGG, D.D.S.,

FORMERLY PROFESSOR OF DENTAL PATHOLOGY AND THERAPEUTICS IN PHILADELPHIA DENTAL COLLEGE.

[Entered according to Act of Congress, in the year 1873, by J. Foster Flagg, D.D.S., in the office of the Librarian of Congress at Washington.]

(Continued from page 255.)

In these cases it should be recognized that the main object of this first application is the reduction of this *excessive* hyper-sensibility; that ordinary hyper-sensibility would not demand such exceeding care, and, that by this method of procedure we may insure *great comfort* as an *immediate* result of our application, where before was great suffering.

This is gain enough for a first sitting, and much better prepares *both patient and tissues* for the subsequently easy crowding back of gum and final filling of the cavity.

Should pain still continue, even after the first gentle and accurate treatment which I have indicated, the painting of the inflamed gum with the dental tincture of aconite from a soft pellet of cotton will generally afford prompt and decided relief.

VII. *Mechanical irritation* (*injuries, etc.*).—The undue *use* of the teeth, such as the *occasional* mastication of very hard food, or the enforced continual use of one side of the denture in consequence of loss of teeth precluding mastication upon the other side, or the *abuse* of the teeth by such habits as cracking hard nuts, eating ice, bending nails, wire, or even pins, chewing wood, and the like, are all liable to produce either acute or (worse) chronic periodontitis, and warning in regard to this should be given patients, that they may not ignorantly inflict this discomfort upon themselves.

Indeed, upon a recognition of this liability they may easily exercise that constant care and intermittent relief from exertion, toward their teeth, by abstaining from injurious habits and by a proper selection of soft food, when indicated, which will be of exceeding benefit to them by *greatly prolonging* the comfortable existence of their natural dentures.

Injuries, such as blows either *directly* upon the teeth, or, *indirectly*, upon the jaw, causing forcible occlusion of the teeth, may result not only in fractures (greater or less in extent), but also in peridental irritation, ranging from *slight* to that of sufficient violence to eventuate in *death of the pulp* and even *of the tooth itself.*

It is eminently worthy of note, in this connection, that while the first of these results, viz., *slight periodontitis*, is the usually immediate sequence of such accidents, the second effect, viz., death of the pulp, is more generally developed in the course of weeks, or, it may be, of months, while the third, deplorable result, viz., death of the tooth (dental necrosis), *may* require years—sometimes several, *or even many* —before it is finally pronounced.

On the other hand, just the reverse of all this may occur; a severe blow (with dynamic patients) or a comparatively slight injury (with adynamic patients) may result promptly in exceeding tenderness and looseness with inability to use the tooth; rapid acute or chronic inflammation of the peridentium; death of this membrane; prompt and excessive pulp-irritation with its concomitant *paroxysmal* pains; prompt death of the pulp; and all this followed by either,—1st, continued and increasing soreness and looseness of the tooth, compelling an early resort to extraction, or, 2d, a gradual cessation of soreness and decrease of looseness with *toleration* of the devitalized organ by the surrounding parts.

This condition of things may continue for a varying period of time, but *discoloration*, and some elongation of the tooth, is a usual result.

When this *toleration* of such a tooth occurs, there is almost entire, or even complete exemption from any annoyance until a subsequent peridental irritation is induced by the *putrescing of the pulp* (13th cause of periodontitis), to which reference will be made under that head; but even this second trouble may be promptly relieved by drilling into the pulp-cavity, and by proper subsequent treatment (which will be given in place), and the tooth yet retained.

It will, however, be but a question of time, that the gradually increasing elongation of the tooth will finally result in its exfoliation, or, in such degree of looseness as to render it annoying and possibly painful from that cause; for which extraction is the only remedy.

It will be sufficient for the present to mention, as palliative treatment for injuries of this kind, *in acute trouble with much pain*, the local application of dental tincture of aconite (from pellet of cotton), by painting the gum, or, the placing on the gum of a thin pad of folded muslin frequently saturated with a mixture of equal parts of laudanum and phénol sodique, or, of resort to the *combined* influence of both aconite-painting and the soothing application.

In cases of adynamic complication which promise *chronic inflammation without very much suffering*, the frequent local application of phénol sodique or tincture of arnica upon pads of muslin, for several consecutive days or even weeks (in extreme cases), will be found productive of constant relief and a gradual restoration to a reasonably permanent desirable condition.

I wish, at this time, to direct attention to the *tincture of calendula* (marigold), and to those preparations of hamamelis (witch-hazel), popularly known as Pond's and Humphrey's extracts.

I have used, with much satisfaction, both *calendula* and *hamamelis* for the past fifteen years, and would recommend them as notably curative and pain-obtunding.

Fracture of tooth implicating the root portion.—While discussing the subject of "pulp-irritation" under the head (*i*) Fracture of tooth,—DENTAL COSMOS, January, 1877, page 4,—allusion was made to the *splitting of teeth* from congestion of the pulp.

I then gave it as myexperience in practice that extensive lesions of this kind (splitting) were, except under some modifying circumstances, very amenable to treatment.

The continuance of this subject is now in place, and under this head of "mechanical irritation" I would include all injuries, such as multi-rooted teeth, split through their roots, into two or more pieces, or, fractures, through the root, more or less obliquely, of single-rooted teeth.

The suffering which such lesions as these entail is singularly at variance with the size or extent of the lesion; thus, a tooth may have a fracture which impinges but slightly upon its root portion and yet much tenderness and pain will supervene, due usually to the mobility of the fractured piece; while again the roots of a lower molar may be split in two, or those of an upper molar *in three*, and but little inconvenience result even with some use of the tooth.

On the contrary, a slight fracture, accompanied with great looseness of the fractured crown portion, may occasion little or no discomfort, while a decided fracture, separating roots, may produce great pain, even with scarcely any perceptible movement of the crown pieces, and entirely preclude the least use of the tooth, or, indeed, of those adjoining it.

It is, however, also true, that conditions co-existent with fracture are no criterion as to probable result of operation for relief,—such operations sometimes affording little or no benefit in cases of trifling abnormality, while at other times perfect comfort is given, where before the patient suffered intensely.

For many years the operation of securing split teeth by means of wire ligatures has been practiced; this rude, but sometimes very successful, device was followed by the operation known as "bolting" the teeth.

This consisted in drilling a hole through the split pieces in such wise as to permit of passing a gold bolt furnished with a screw or rivet head, and with a screw thread cut to fit a bur, into which it could be screwed so as to securely fasten the pieces together; the head of the bolt being let into a counter-sink at one end of the hole, and the bur into another at the other end, these were properly secured by covering fillings; the crevice of the split was then prepared as though it were a cavity of decay, and the needed filling so introduced as to meet the varied and complicated indications of pulp-cavity and root and crown fracture.

This operation I have performed five times, but I have *usually* found it neither very serviceable nor compensating to the patient or myself; the greatest "length of duration" which I have ever accomplished was one of eleven years' standing, but the others lasted respectively from *one* to seven years.

The ligation (very solidly) of the fractured pieces by means of gill-net twine, and the permanent union of the parts by means of gold filling (cohesive foil and sponge gold), was the next step. I have one fractured lateral (very frail) of this line of work which has already done eight years' service and is still in excellent condition,—it is, however, carefully favored and is avoided during mastication.

But of late years such advance has been made in the materials and working of plastic fillings, that all these intricate and necessarily expensive operations have been superseded by others so comparatively easy and economical, that the filling of split teeth and roots has, with me, become one of the ordinary duties of practice, and I now count such operations among my patients by the score.

Concisely, my method of filling such teeth now consists of ligating the pieces by means of *book-binder's thread,—this to be done very firmly,*—the tooth is then prepared by entering the pulp-cavity and canals, and so dressing out the crevices of fracture as to permit of the introduction of the filling material as to prevent ingress of moisture from the alveolar direction; the crown pieces are then so slotted, beveled, and fissure-drilled as to permit the introduction of a tying, edge-protecting, and dove-tailed plastic filling.

After the usual canal medication, and the placing in position of the cotton *canal* dressings, the *pulp-cavity* and *those portions of the dressed-*

out crevices which impinge upon it are filled with gutta-percha (low-heat test and adhesive), after which in molars, *with strong walls*, the crown is filled and bound together by means of *quick-setting* amalgam of different degrees of plasticity,—the thread is allowed to remain on for twenty-four hours,—and in a week or more the "tap" to connect with the pulp-cavity filling and canals (to be a means of ingress in event of future trouble) is drilled through the crown.

If the tooth has frail walls, these are strengthened by "lining" with some one of the zinc plastics, which is allowed to harden thoroughly for several days, after which, if any one of the *oxychlorides* is used, the *exposed* portions are bur-drilled out, and a cavity so arranged as to make a *protecting* filling of amalgam,—this does not *seem* so necessary if the oxyphosphate is used.

I have experienced more failures with split bicuspids than with any other teeth, but have had largely increased success during the past three years since adopting the suggestion of Prof. D. D. Smith, by which the bicuspid is practically transformed into a cuspid by cutting off the inner cusp.

In plastic filling, with amalgam, these teeth should *always* be "lined" buccally, to prevent the *possibility* of discoloration.

VIII. *Dental manipulation.*—This cause of periodontitis is, far too frequently, one of the *questionable benefits* bestowed by dentistry. It is too true that not only is many a tooth already tender rendered more so by injudicious manipulation, but many a tooth which is *giving no trouble*, and would not have given any under judicious treatment, is so manipulated as promptly to *give rise to great suffering*, and not infrequently to *loss of the tooth.*

Dental manipulation has been again and again alluded to as a *serious source* of trouble, but even yet it is only vaguely and occasionally understood *why* this is so, and indeed it is generally viewed as resulting from *too much* and *too long continued* hard drilling, chiseling or plug-impacting.

It remains yet to be learned, by the vast majority of our profession, that the *mere introduction of a cotton pellet* will, under some circumstances, excite severe peridental irritation, while under others a two or three hours' impacting of foil will produce no unpleasant result.

Thus it must be recognized that other considerations beside that of mere forcible infliction should be clearly understood and constantly remembered.

This being so, it will of course be impossible at this time to particularize, in every direction, the dangers of dental manipulation, but the generalizations regarding temperamental powers of endurance, liability to irritation, danger of acute or chronic sequences, power of tissue resistance and of recuperation, may well be presented.

It is sad indeed that there is any necessity for writing in condemnation of the *inflictions* of dentistry,—that the unavoidable chiseling, drilling, and scraping of tooth-tissue are unpleasant, and, to some, *excessively* disagreeable, is undeniable; but beyond this, the manner and method of manipulation most in vogue, *and believed to be unavoidable*, is such as that an *absolute dread*, *well-nigh universal*, *is so deeply rooted in the popular mind*, that nothing less than *an entire generation of thorough*, *gentle operators* will commence, in any degree, to eradicate this impression.

It must be understood that *all* that a patient can *endure* is not safe *because he can endure it;* it must be understood *as not true* that *excessive* irritation is not liable to occur, *because* during the work no *perceptible* irritation has been experienced; it must be understood that *prospective* danger has its tendencies just as markedly *acute* or *chronic* as is existing danger possessed of these peculiarities; it must be understood that *tissue resistance to irritants*, which is *long suffering* and *slow* to *anger*, is equally determined in violent aberration when finally aroused; it must be understood that temperamental *patience under infliction* is most likely to prove equally tardy and unsatisfactory in its efforts at recuperation.

With these points constantly before the mind, and with a knowledge of *minutiæ* in regard to *possibilities of irritation* in connection with the varied phases of dental manipulation, that *combined* guard against danger from this cause will be possessed by the operator, which is the patient's surest guarantee against unnecessary suffering.

(To be continued.)

REGULATION OF TEETH MADE EASY BY THE POSITIVE SYSTEM.

BY J. N. FARRAR, M.D., BROOKLYN, N. Y.

LANGUAGE OF POSITION, APPLICATION OF FORCES, MIXED CLASS CONCLUDED.

VI.

In order the more easily to communicate thought respecting the position of surface diseases of teeth, there has been established a certain language or nomenclature by which any special point upon the surface of any tooth may be easily and readily designated. Thus, we may speak of a cavity as being in the distal or bucca-distal surface of the left superior sixth-year molar, etc.

Without some such generally understood nomenclature, or system of terms, it would be difficult to clearly express, in a brief way, our ideas upon the subject. I have, therefore, thought that, before continuing upon my subject of irregularities of the teeth, it may be well, in order to simplify language, that we thoroughly understand some similar nomenclature in regard to their location. Such a nomenclature, although entirely new so far as I know, is not difficult, and may be easily learned in thirty minutes.

In the last paper (February DENTAL COSMOS) the three principal or typical esthetic lines of arch were treated of. These lines are the base lines to which the nomenclature of position of teeth must all have reference. A position anywhere outside of this line, whether labial or buccal, should be considered *anterior* to it, while a position inside of it, and next to the tongue, is *posterior* to it.

When a tooth is situated in its proper place, and in a proper attitude upon the esthetic line, it may be said to be in position.

If the tooth be directly outside of its proper position on the line, it may be said to be in an anterior position.

If the tooth be directly inside of its proper position on the line, it may be said to stand in the posterior position.

If the tooth is situated to the right or to the left of either of the three above-named positions, it may be said to be to the right or left of such position. Thus we may say it is in the right or left position, or it is in the right or in the left anterior or posterior position, as the case may be.

If any of the six front teeth of either jaw have, in addition to these positions, a leaning posture, the word "inclined" or "inclination," with the words "right" or "left," and with all teeth back of the cuspids the words "forward" or "backward," associated with the other and suitable descriptive words, may indicate the direction of the inclination.

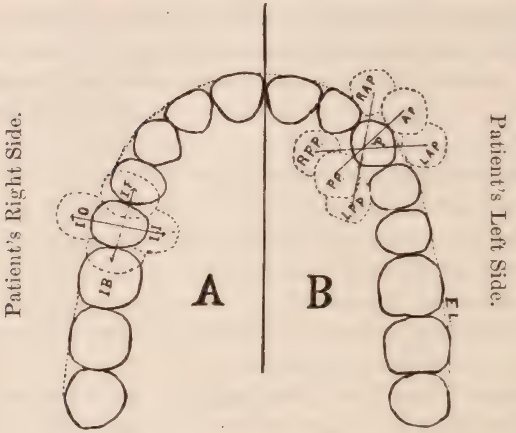
We may take, for example, the left superior cuspid to illustrate the language of positions of all teeth. Thus, we may say the left superior cuspid is *in position*, or that it is in the *anterior position*, or it is in the *right anterior position*, or it is in the *left anterior position*, or it is in the *posterior position*, or it is in the *right* or *in the left posterior position*, as the case may be; and, as before stated, if the tooth be in any of these positions and yet have a leaning attitude, we may express the attitude of its position by prefixing the word "*inclined*."

For illustration, we may say that the *left superior cuspid is in position, but is "inclined" to the "right" or "left,"* or *the bicuspid or molar may be in "position," but inclines forward or backward, inwardly or outwardly*, as the case may be.

B of Fig. 15 is an illustration showing the different positions of the left upper cuspid; *A*, the direction of the inclination of the right second bicuspid.

B of the diagram also illustrates the nomenclature of the seven positions of the cuspid tooth; the inclined attitudes may be supplied by imagination. *A*, represents the nomenclature of the four inclining attitudes of the right second bicuspid tooth.

Fig. 15.



Cuspid.—*P*, position; *A*, *P*, anterior position; *R*, *A*, *P*, right anterior position; *L*, *A*, *P*, left anterior position; *P*, *P*, posterior position; *R*, *P*, *P*, right posterior position; *L*, *P*, *P*, left posterior position.

All of these may also have an inclination to the right or left, forward or backward. *I*, *R*, would stand for inclination to the right; *I*, *L*, inclination to the left.

Bicuspid.—*I*, *F*, inclined forward; *I*, *B*, inclined backward; *I*, *O*, inclined outward; *I*, *I*, inclined inward; *E*, *L*, esthetic line.

Application of Forces.

There is another point that may be dwelt upon a little to advantage. In a former paper it was hinted that all forces applied to teeth to be moved should be so made that, if possible, they will not tend to raise the teeth within their sockets. This is important.

Exactly how to avoid the rising is not always easy to determine, because the teeth to be moved and the "anchor teeth," to which the apparatus is secured as bases of draught, are so nearly on the same level or line that there is not much opportunity to place the anchor apparatus below the line of the point of attachment on the tooth or teeth to be moved; still, this can generally be attained sufficiently by a little calculation.

Fortunately the back teeth are not so easily lifted in their sockets by regulating as the front ones; hence, the anchor extremity of the apparatus may be made successfully to act from points very near the gums, so that, if the other end of attachment (upon the teeth to be moved) be made near their cutting edges, the draught will not be a lifting one.

In order to be comparatively sure that the force applied will not raise a front tooth in its socket, it should, if practicable, *be made to draw at an angle not exceeding ninety degrees from the apical end of its longer axial diameter; and, better still, not to exceed ninety degrees from the apical end of the long surface-line of that side of the root which is in advance while being moved, for it is impossible for a force, applied at right angles to the surface of anything, to cause it to move in a lateral direction.*

Fig. 16.

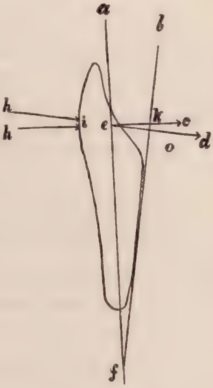


Fig. 16 illustrates the different lines of forces above referred to. *a*, *f* represents the longer axial line of the tooth; *f*, *e*, *c*, an angle of ninety degrees; *f*, *b* is the long advancing surface-line; *b*, *o*, *d* is an angle of ninety degrees. A force applied from the point *a* at the crown extremity of the longer axial diameter, *a*, *f*, of the tooth will tend to raise the tooth directly from its socket. While a force applied from the direction of *d*, at right angles with the surface-line *f*, *b*, at the point *o*, cannot (if the root be straight) cause the tooth to rise in its socket; but if a force be applied at any angle greater than ninety degrees from the apical extremity of the line *f*, *b*, it is an approach to the former condition, and will tend to raise the tooth.

Although the angle *f*, *e*, *c* on the longer axial line *a*, *f* is only ninety degrees, yet as the point *c* is between *d* and *a*, the angle *f*, *k*, *c* is greater than ninety degrees; consequently, a force applied from the point *c* will more or less tend to, and possibly may, raise the tooth in its socket; such a case depending as it must somewhat upon the degree of the angle at which the force is acting.

However, experience teaches that though this may be theoretically true in all cases, still, owing to resistance of the socket attachments or the peculiar shape of some roots, teeth will generally permit of a draught being made upon them at an angle somewhat greater than ninety degrees, from the apical end of the long advancing surface-line, but it is not prudent to act too much upon it.

As before hinted, the extent of this apparent departure from the law of forces depends upon circumstances, such as the duration of the application of the force, the length and shape of the root, and the degree of firmness of the attachment between it and the socket; but more upon the shape of the root.

Whether teeth indicate or call for pushing or drawing apparatus to move them, the force should be applied at a somewhat similar angle, though from opposite directions.

This may be easily understood by reference to Figs. 17, 18, 19, where, owing to the difference in shape of roots, it will be plainly seen that the forces may and sometimes should be applied differently.

For a root shaped like Fig. 17, the attachment should be made nearer the cutting-edge of the crown (at *o*) than is necessary with teeth whose roots are shaped like Figs. 18 and 19, which would not tend to rise within the socket, even if the forces were made to draw in the line of *e*, *g*, Fig. 19.

Fig. 17.

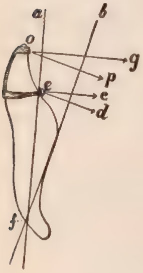


Fig. 18.

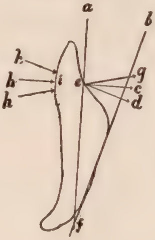
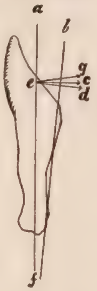


Fig. 19.



Of course, it is not easy to foreknow the exact shape of the roots of teeth, and experiment must, therefore, enter more or less into all treatment for regulation.

As before suggested, also, all apparatus constructed upon a plan to be used within the arch for forcing front teeth from anterior positions, should be secured so as to draw from points sufficiently near their cutting-edges to avoid this lifting trouble. This is largely accomplished also by having their anchorages made as low and near the gum (or roof of the mouth) as possible.

Generally the teeth, and especially front ones, may be more firmly bound about midway of their crowns, and this (in practice) is usually the best place to operate from; but, as before said, there are cases where this force should be made to act from the cutting-edge.

This may be done by passing from the anchorage point a thin, narrow strip of gold-plate, or small wire, over the cutting edge of the tooth to be moved, and then securing it to a little clamp-band, fastened midway around the crown or to an apparatus, as shown in Fig. 17 (which offers a better opportunity for its attachment), in order to make the force act in a direction (*o*, *p*) that will not tend to raise the tooth in its socket.

Special Cases.

Let us now direct our attention to special cases of regulation.

It may be well to state that when I began to regulate teeth on the positive plan, there were desired movements of the teeth which at first seemed impossible to gain by this system of mechanism, as was hinted in my first paper upon the Law (January Dental Cosmos,

1876) upon which the Positive System is based; but such difficulties have since been overcome. Every month brings up not only more improvements, but greater simplicity in the construction of apparatus for regulating teeth by this system, thus making it more and more useful.

Sometimes a tooth crowds upon another in such wise as not only to force its crown out of its proper position, but the apex of the root also. When such is the case, both teeth are often rendered very difficult of satisfactory management.

Such instances are met with when a cuspid erupting anterior to the lateral incisor not only is prevented from placing itself on the proper line, but also forces the incisor bodily into one of the posterior positions (within the esthetic line) so far, that even if the arch be widened enough to offer sufficient space to accommodate the crowns of *all* the teeth, if placed on line, the lateral incisor may be found to incline so much out of its proper angle as to be unsightly.

When a cuspid erupts outside of a lateral incisor, if the central incisor teeth are not too far to one side of the median line of the lips and nose, and there is no space for the cuspid, and if other circumstances will warrant it and admit of it, the extraction of the cuspid may sometimes be good practice; for the lateral incisor tooth may then be easily moved directly into position (on line) without causing an unsightly inclination, and the first bicuspid may be so shaped with the corundum-wheel that it will (except in shade of color, which is somewhat lighter) fill the artistic value of the cuspid. How to force the lateral incisor into position, may be learned by several devices shown in the illustrations in the last as well as in the present paper.

In regulating teeth I do not think a plate covering the entire roof of the mouth is proper, unless it be removed and cleansed daily. Indeed, as yet I see no point of value in a full plate under any circumstances that cannot be better attained by some form of skeleton apparatus.

Although it is occasionally better to move teeth independently, yet they may sometimes be moved collectively with success. Even the entire arch may be under movement at the same time if the force be not made too great at any one given time.

Instead of separate bands being applied around each tooth to be moved, a bar embracing several in groups may sometimes be used to greater advantage.

In the February number of the Dental Cosmos was explained one form of apparatus for regulating protruded upper front teeth separately.

Fig. 20 illustrates a different modification of the apparatus for accomplishing the same object collectively. The apparatus is made to draw upon the outstanding teeth by the tightening of the nuts (*a*) similar to that device explained in the number of DENTAL COSMOS referred to, but differs from it in construction in applying the forces to the teeth by a bar or plate (*b*) extending across all of the teeth to be moved.

In all the accompanying figures, the arrows indicate the direction of the movement of the teeth operated upon.

FIG. 20.

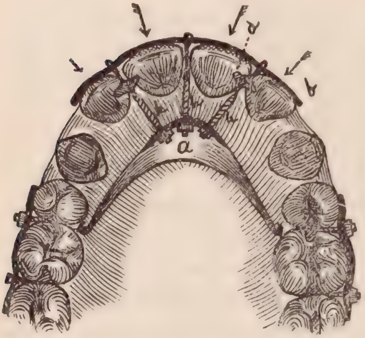


FIG. 21.

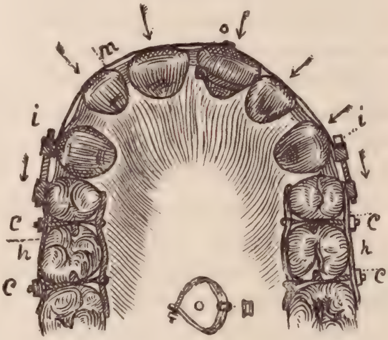
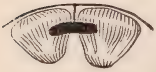


Fig. 21 illustrates another form of apparatus which acts upon the teeth collectively, also by means of a band (*m*) extending along the outer surfaces, and which is made to force against the teeth to be moved by tightening of bolts which pass through smooth-bored nuts (*i*, *i*) soldered to the ends of the band (*m*), and which enter threaded nuts soldered to anchor-bands (*h*, *c*) secured around the back teeth as shown. The bar *b* of Fig. 20, and band *m* of Fig. 21, should be prevented from impinging on the front gum by passing through the eye of a clamp-band *o*, secured to a *front tooth*, or, *better still, by having a* T (Fig. 22) *soldered to the inside, so that the top of the* T *shall rest on the lingual surfaces of the central incisors.*

FIG. 22.



Esthetics necessarily influences the decision between appliances which are mechanically of equal value. For instance, an apparatus like those illustrated in Figs. 20 and 21 may be simpler, and, all things considered, better for a boy, or any person who does not care for personal appearance; but a lady in high life and accustomed to mingling much in society would be disfigured by a band or bar across the front surfaces of her teeth, which would be obviated by an apparatus like that illustrated in the February DENTAL COSMOS.

There is an excellent variety of regulating instruments, devised several years ago by Dr. C. S. Longstreet, and improved by Dr.

A. McCollom, known as jack-screws, which, when still further modified, are well adapted for use in the positive system. I will speak of the different modifications as the fish-tail spindle and drag-jacks.

The simplicity of the jack-screw recommends it, but in order to make it successful it should be applied with care, especially the spindle form, as it rides only on a needle point, which, if applied to one side of the central axis of a single-rooted tooth, may tend to rotate it in its socket. Fig. 23 represents the Longstreet and McCollom jack-screws.

Fig. 23.

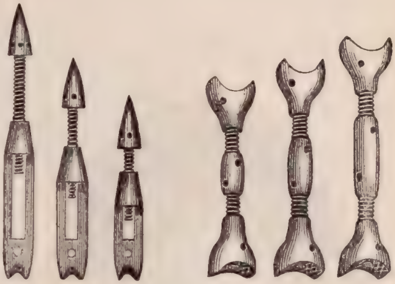
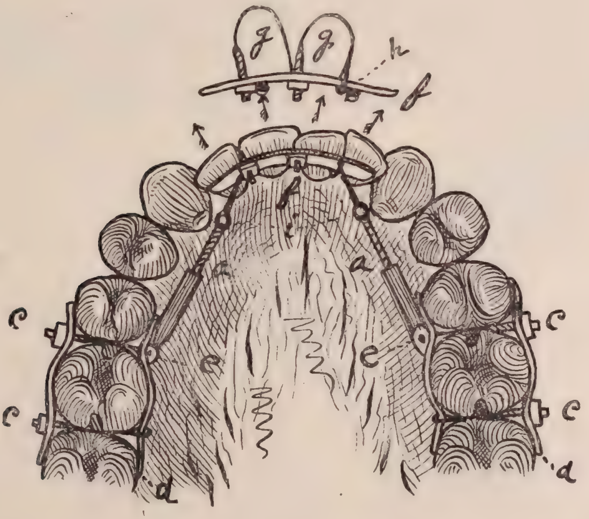


Fig. 24 illustrates an ideal case of the lower jaw having the incisors in the posterior position, and which are being forced forward and into position by a compound variety of jack-screw devices. This appliance does its work by pushing against a bar situated immediately behind the teeth to be moved. Fig. 25 is accomplishing the same result by drawing upon the bars secured to the lingual surfaces of the teeth from another in front as shown. Although this is the simpler of the two devices, yet it is objectionable in the point of esthetics above referred to.

Fig. 24.



In Fig. 24 the jack-screws are secured posteriorly to anchor-clamp bands (*c*, *c*) around two of the back teeth by a hook or rivet-hinge joint (*e*), and anteriorly into little pits made in the bar (*f*) by counter-sinks or cups soldered to it.

Fig. 25 represents a device made up of the same form of bar (*a*) behind the teeth, to be moved as illustrated in Fig. 24, but which is made to force the incisor teeth forward by attachment to little bolts (*d*, *d*), which pass through a bridge-bar (*b*), which is tightened by nuts on the front sides.

Fig. 25.

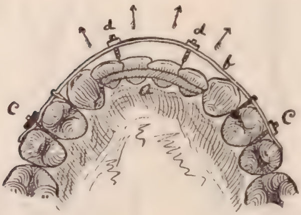


Fig. 26.

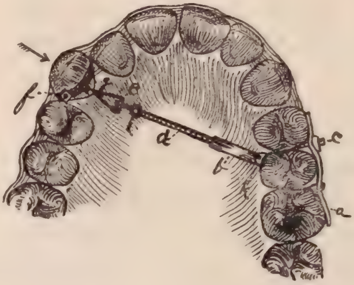


Fig. 26 illustrates a device in the form of a drag- or swivel-jack (*d*) in the act of drawing upon to move a cuspid (*f*) tooth by forces based at the opposite side of the mouth (*c*, *c*). The cut so clearly shows its construction that it needs no further explanation.

Fig. 27.

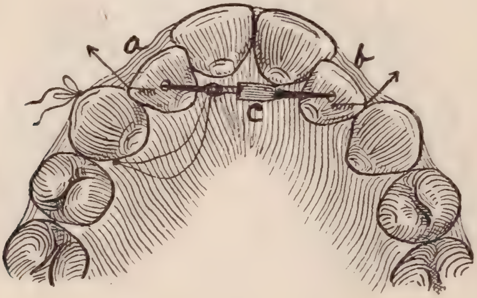


Fig. 27 represents the application of a spindle jack-screw (*c*) in position to force outwardly the two upper lateral incisors (*a*, *b*) which have erupted in the posterior position.

Fig. 28 illustrates the application of a compound jack-screw (*f*) made of the spindle and fish-tail varieties combined.

The spindle-points should rest in pits, made in the teeth by a drill, or in cups or pits made in or on a clamp-band (*g*) secured around the tooth, as shown in Fig. 28.

To avoid the swallowing of small pieces of regulating apparatus which may get loose, they should be secured to some teeth by threads, as shown in Figs. 27 and 28.

FIG. 28.

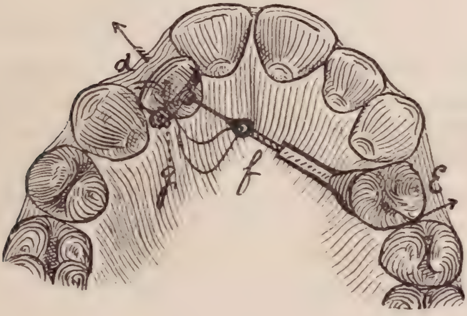
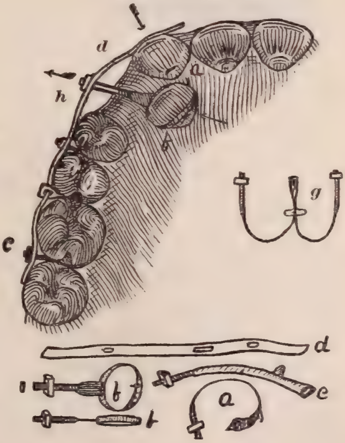


Fig. 29 illustrates a case where the right superior cuspid erupted in the left posterior position and stood behind the lateral incisor. Such cases may be easily reduced by a device as shown.

FIG. 29.



The bar (*d*), made of thick plate, about one-eighth of an inch wide, is secured at one end (*c*) to a molar or bicuspid tooth (or both) by means of some kind of a clamp-band, *a*, *c*, or *g*, while the other extremity should rest upon the lateral incisor tooth (*a*). This forms a bridge of the bar, which is pierced midway by an oblong hole through which is passed a flat screw (*b*, *b*), so made by filing off two sides (in order to prevent its turning when the nut is tightened), one end of which is either hammered to the thickness of paper or soldered to a thin plate at the free extremity of which is soldered a thin band (*b*, *b*), which fits tightly around the crown of the cuspid to be moved.

In order to prevent the band from slipping off the tooth it may have soldered on its inside a metallic pin-point, which should fit into a little hole drilled into the tooth.

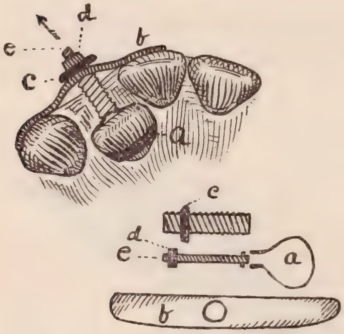
A nut (*h*) is then tightened, which not only draws the cuspid into position, but forces the lateral incisor (which is now partially in an anterior position) into its proper position.

It will be plainly seen that the one nut (*h*) will cause the two teeth to move in nearly opposite directions, as indicated by arrows. The lateral incisor, although not receiving the degree of force given to the cuspid, will easily fall into position by a carom motion from the central incisor, which guides it partially into the space left by the departing cuspid.

Once in a great while it becomes necessary to exercise uncommon force to move a tooth. When such teeth present themselves they are usually packed in with others so tightly as to render it almost impossible to use a band clamp which requires a small screw to pass between them.

Fig. 30 illustrates a cylinder box-wrench which will overcome this difficulty in some cases. The instrument is made very similar to the "box-wrench" explained in the Dental Cosmos for October, 1877, but differs in the sleeve being cylindrical instead of square, and it also has a thread cut upon its outer surface, on which is placed a larger nut (*c*), which, when tightened upon the bridge-bar (*b*) after the wrench has first been firmly secured to the tooth to be moved by a smaller nut (*d*), causes a powerful draught upon the tooth. This device is somewhat clumsy, but happily it is rarely needed; yet it is well to remember its construction.

Fig. 30.



Some of these numerous devices which I have explained are more suitable for some cases than others. Judgment and ingenuity should always be exercised in order to make any apparatus work well. Little points overlooked may render the best machine worthless. Close, careful application of little bearings is very necessary to success. Coarse, slip-shod work will not do. Make every case a study, and there is not much danger of failure. It may be well here to say, also, that no one can expect to meet with easy success in using this sort of apparatus without being supplied with properly-made keys and wrenches, which should not be less than from four to six inches in length.

(To be continued.)

TRANSLATION.

THE DENTAL PULP AND ITS DISEASES, FROM THE GERMAN STAND-POINT.

TRANSLATED FROM DR. R. BAUME'S "LEHRBUCH DER ZAHNHEILKUNDE."

(Continued from page 202.)

Diagnosis.—The recognition of pulp-inflammation is, as a rule, no difficult matter. The patient points out a particular tooth, describing with accuracy symptoms with which experience has made us familiar, as being associated with pulpitis. We have only to examine the case to verify the account, or to discover, what is occasionally the case, that the sufferer labors under an entire delusion concerning the starting point of his pain.

The method of examination will depend upon the description given as to the origin of the disease. We are to seek, as it were, to touch the pain we inquire after. We understand that direct contact with an exposed pulp by a sharp-pointed instrument provokes pain. Therefore, as a means which is to take precedence, we employ the excavator, seeking to discover whether or not there is exposure in a situation which has been pointed out. Should pain attend the contact the diagnosis is to be esteemed as made. If, however, no pain results, the probe is to be carried deeper and more energetically into and about the carious hole.

Where inflammation may be inferred to exist, while a pulp is yet unexposed, recourse is to be had to the tests by cold or warm water. To such end the syringe is to be employed; the water, cold or warm, as may be selected, being thrown with some force into the cavity. In cases of this description the cold or warm water, used as suggested, is the principal diagnostic means.

Not always, however, is a diagnosis to be secured thus easily. There come, now and then, cases before us where an exhibition of every attentiveness and skill is requisite to the recognition. Where, for example, several teeth are found alike affected with caries, or where the caries is of such situation that the mouth-glass fails to show it, or where holes of pinlike diameter lead into a pulp. In all these cases our best dependence is upon the syringe. If, following the cold or hot application, pain results, means are to be employed for verifying or disproving the inference. Where it exists between teeth, these organs are to be so separated as to permit of a thorough examination of the approximal faces.

Difficulty in diagnosis is likewise found where the irritation does not exist in a carious hole, but where, through recession of the gum, the neck of a tooth has been laid bare. These cases are peculiarly deceptive and demand close examination. By examination with a sharp excavator the sensibility is made to show itself at some point about the exposed neck.

Of great obscurity and attended with a necessary disagreeableness of examination are the cases where the affected pulp underlies some one of several fillings. The patient comes to us complaining of severe pain, but finds himself unable to distinguish the location, as any particular tooth is concerned. We examine with great accurateness, finding no carious holes, but in place of these a number of good fillings made of a variety of materials. We know, certainly, that the trouble lies in association with some one of these fillings, but which particular one we do not know.

The examination, as suggested, is in these cases attended with difficulty. One would not willingly disturb a part not at all involved, and yet that seems a necessity in the search for a diagnosis. Before proceeding to the removal of any of the fillings it is desirable to satisfy one's self that no renewal of carious action exists about their circumferences. To this end the operator is to go round each one most carefully with a very fine-pointed excavator. If in such examination one comes upon a defective place, contact with which is attended by pain, the inference is fair that the seat of trouble has been discovered. Does such manner of examination, however, result in nothing, recourse is to be had to the shock resulting from bringing cold water in contact with the plugs. This is a means which seldom fails in enabling the patient to afford some little help, at least, in the search. Do such means afford no directions, then the dentist is to fall back upon his practical sagacity. He begins by boring through that filling which he may infer to be most closely related with the seat of pain; if a mistake is made he passes to another tooth, and so on until the faulty one is discovered.

Great difficulty attends the diagnosis of spontaneous inflammation associated with the pulps of teeth perfectly intact. We are aware that that character of tooth-pain very seldom occurs. One standpoint for the recognition of such trouble is found by us in pregnant women, or associated with the menstrual period of the sex. Commonly, it is the case that the patient finds herself able to point out with sufficient accuracy the diseased tooth. Where this, however, is not the case the dentist finds himself in a sufficiently difficult situation.

There come before us cases where one is entirely at a loss how to begin an examination. Unless, indeed, some precedent case affords an assistance, the practitioner finds himself quite at sea. It is the case, however, that an idiopathically diseased pulp is likely, sooner or later, to provoke periosteal inflammation; here then we come first to a standing place. The affected tooth now becomes sensible to percussion. At this point is a diagnosis found easy.

The recognition of pulpitis, dependent on the presence of nodules in the organ, is likewise attended with great difficulty. When, however, pain develops slowly in a perfectly sound organ, it is an inference that the trouble arises out of either idiopathic inflammation or the dentinal new formations. The search, however, after the particular tooth implicated leads often through a wearisome examination; the diagnosis in many cases is only to be made upon the development of a periodontitis. After the extraction, the existence of a new formation is very easily recognized. In instances where teeth have been previously lost from this same cause, the practitioner finds himself directed in an understanding of his case.

The determined assurance of a patient that some particular tooth is the seat of an existing pain is not by any means necessarily worthy of acceptance. One may have felt severe pain in a tooth in times past; the location of this pain, because of a long absence, comes to be forgotten. If now a trouble expresses itself wide-spread over the trigeminal tract, it is deemed to be face-ache and not an odontalgia. This opinion, however, the dentist is not to accept. He is to make search for the affected tooth, which tooth in 999 cases out of the 1000 he will find to be the cause of the general pain. Later there returns to the patient a memory of the fact that before his face-pain he had tooth-pain. Let the tooth that has been discovered be treated successfully, and the face trouble will be found to disappear.

In general such diagnoses are not difficult to make, provided the practitioner guards against being misled in the treatment of the case by the opinions of the patient. One is not to allow his judgment to be diverted from examination in the proper direction. The lesson of a daily experience teaches that, after an odontalgia has continued for some time, patients grow unmindful of the original seat of pain, being, indeed, unable to point it out, locating it often enough not only in an entirely different tooth, but even on the opposite side of the jaw.

When a pulpitis expresses itself as a neuralgia located in a distant region, diagnosis is necessarily obscured. If the patient be unconscious of the tooth-pain, we have, of course, the neurosis alone. We proceed, however, to look for affected tooth-pulps, and in such search commonly come to a reward in the discovery of the origin of the neurosis. Through the neuralgia we are directed to the odontalgia.

The consequences of pulp-inflammation are not difficult of recognition. Suppuration is a very evident matter. The patient feels generally an over-fullness about the tooth and jaw; pus mingled in considerable quantity with the fluid is observable by the naked eye.

One is continually to bear in mind the possibility that already a little multitude of pus-cells may have developed, for it is known that suppuration of the pulp is of more frequent occurrence than has commonly been supposed.

Gangrene of the pulp is very easily recognized. The affected tooth is miscolored. The prominent diagnostic is the offensive odor arising out of the condition. If one carries an excavator into such a pulp-cavity he will not find himself mistaken in this odor. The moist kind shows a smeariness upon the excavator. When the gangrene is dry the instrument shows the difference; while the odor is much less offensive.

Teeth having gangrenous pulps are entirely insensible. The œdematous swelling attendant on pulp-gangrene is known to be almost unattended with pain. The patient has in the tooth which is partially or wholly insensible to contact, only a dull, heavy feeling. The jaw is in nowise involved. Pus is by no means a frequent sequence to the swelling.

Hypertrophy of the pulp is conspicuous to the naked eye. The red gum-colored tumor is commonly glazed, seldom is it found fungous in appearance, or flap-like. Through this glazed appearance, and above all, through its insensibility, is it to be distinguished from the gum-polyp. Yet is this last diagnostic not always accurate, as pulp-polyps are sometimes met with which are not by any means without sensibility. Generally one distinguishes between the two by the location occupied.

Periodontitis is recognizable through the sensibility which the tooth exhibits against percussion. Mistake concerning periodonteal inflammation is not easily possible; in its very incipiency a tap upon the affected tooth elicits pain. Sometimes it is the case that pulpitis and periodontitis exist together. This double condition is easily enough exposed by the proper examination.

One is to guard against confusing the pain which arises out of irritation of the gum with true odontalgia. Patients complain, not infrequently, of a feeling of contraction in the tooth. An examination, however, discovers no defect. By close examination we discover, perhaps, the cause in a ragged edge of gum-tissue, or in an interdental papilla which may have become inflamed. Such cases we cure by so simple a means as the application of an astringent tincture.

Prognosis.—A pulp covered with softened tooth-bone only finds itself in a condition of irritation. The prognosis is favorable, however, so long as no free exposure exists. Where the overlying bone has all been destroyed by the carious action, nothing is lacking to the production of inflammation. Where inflammation has supervened, capping of the organ, however carefully accomplished, promises very little in the way of a satisfactory result. Inflamed pulps offer always a bad prognosis. Generally it is the case that at the time of treatment there are already to be found signs of wounds and suppuration. By suitable treatment directed to the condition of the pulp can the tooth yet be preserved. Many unpleasant results arise out of the filling of cavities over gangrenous pulps. Where a diseased pulp remains in a filled tooth, abscess is a most common result. That which promises the best result is the extirpation of the pulp, combined with a thorough cleansing and disinfection of the root canal.

In inflammation of the intact pulp the expression of pain is confined to one or more teeth. After treatment of the lesion the odontalgia disappears; in some cases, however, the removal of the tooth is found necessary. Very bad are the prognostic experiences associated with pulpitis arising out of dentinal new formations. It is commonly found to be the case that no treatment avails, and that the sufferings of the patient are not to be averted until all the teeth have been removed.

REMARKS UPON THE PULPITIS OF MILK-TEETH.—Pulpitis in the deciduous teeth is met with only where caries has attacked the organs before the process of absorption has commenced. In healthy milk-teeth the set is lost without any essential trouble to the child. In the incisors, particularly, the shedding is accompanied by very little discomfort; if any pain occurs it is apt to associate with the back teeth.

The pain in the pulpitis of children is mostly very bearable and controllable, the ordinary house-medicine, namely, spirits, being found sufficient to the cure. It is for this reason that practice among children,—except as pertains to the treatment of irregularities, is so limited.

Pulpitis is to be esteemed as rare in children. With the loss of the teeth there goes as well waste of the pulps. The organs exhibit themselves raised in their sockets, intact but miscolored. No treatment is demanded, or would avail anything. With the beginning of absorption the milk-tooth progresses after its manner to the end of its age.

Absorption, as a rule, begins with the extremity of the root, interrupted, however, occasionally through association with a bad nervous system. As the granulations encroach upon the pulp, so does the organ disappear. This is a physiological process. One easily understands from it why pain is so infrequent in the deciduous pulp.

There come now and then to our observation, cases where any help that can be afforded by the dentist amounts to nothing. These cases are where exposure of the pulp by caries precedes by a long time the commencement of root-absorption. In these cases a disposition of protection is seen in the pulp similar to that which is manifested in the commencement of an atrophy. A. B. C.

PROCEEDINGS OF DENTAL SOCIETIES.

ALUMNI ASSOCIATION OF THE PENNSYLVANIA COLLEGE OF DENTAL SURGERY.

The Alumni Association of the Pennsylvania College of Dental Surgery commenced its eighth annual session in the college building, on Thursday morning, February 27th, 1878, the president, Dr. J. Hayhurst, in the chair.

The president read the annual address, in which he alluded feelingly to the recent demise of Professor George T. Barker, D.D.S.

Dr. C. N. Peirce then delivered a lecture upon "The Varieties of Teeth found in Animals; their Muco-dermal Origin, and how the Blending of their Different Forms in the Class Mammalia favors the theory that they are but Modifications from some Common Ancestral Type."

Dr. Peirce said: In asking the attention of the association to some thoughts upon this subject, he recognized that it was quite a step from practical dentistry, but yet so closely allied to our profession as a collateral branch, that every member should feel an interest therein. For the convenience of study, scientists have endeavored to arrange or classify animals, extinct as well as living forms, into their most comprehensive groups, relying not on their external characteristics or analogies, but on their plans of structure or affinities; and from such structural conceptions the animal kingdom has been divided and subdivided until we have it arranged into great departments, classes, orders, species, families, varieties, etc. As a result of this work, there is a natural desire to arrive at some definite idea as to how or through what channel this great variety of forms has reached its present status of physical and intellectual development. To the inquiry, What are teeth, and where located? a definition has been given, so general as to apply to all modified structures used as organs of mastication, and might well be embraced in the statement that they are but hard bodies, varying in density and structure, projecting from the *pre-assimilative* portion of the alimentary tract.

Their muco-dermal origin was nicely illustrated by the skeleton of a toad-fish (*Batrachus tau*), showing the dermal spines carried into the mouth without modification.

The great number of bones of the head upon which the teeth are located, their difference in structure, their relative density and relative durability, with the diversity of arrangement of the different tissues of the teeth, were all well illustrated by specimens shown. A classification based upon their external forms was also given, and the attention of the association was drawn to the necessary concomitant variation in the shape and articulation of the lower jaw, rendering the different varieties of teeth most efficient in subserving nutrition. This differentiation in development and structural arrangement exhibits itself not only in the condyle and glenoid cavity, but the vertical or horizontal motion of the lower jaw necessitates greater or less development in the muscles concerned in mastication.

The variation in the number of teeth, and their gradual decrease from the typical forty-four (44) in the Marsupials, to forty (40) in the Fissipedia, thirty-six (36) in bats and the lower order of monkeys, and thirty-two (32) in the higher monkeys and man, was also clearly shown by natural specimens, with the perceptible change in the relative sizes of the posterior teeth; the third molar in the monkeys and Marsupials being the largest of the three, while in the civilized races of man it was much the smaller.

With the skulls upon the table, the lecturer also demonstrated that animals developing a large number of teeth on surfaces remote from, or posterior to, the region of the lips, are always inferior in their mental organization to those erupting a smaller number, and restricting their site or location to the anterior portion of the mouth.

In all of the order Mammalia the teeth are confined to the intermaxillary, superior and inferior maxillary bones, and arranged in a single series immediately behind the lips, and with the root or roots of each tooth inclosed within a bony socket. It is in the mammals that teeth appear in a definite number and in pairs, and *may* possess more than a single fang or root. They are divided usually into two sets or series, a deciduous or milk set and a permanent set, though in some instances the deciduous set is abortive and functionless, disappearing, if not before birth, immediately after it. This latter characteristic is not, however, sufficiently co-ordinated with others to be of service in the classification or grouping of mammals into natural sections.

Among the Carnivora, or flesh-eating animals, the Fissipedes well exemplify the Diphyodont, or animals with two sets of teeth, the milk-teeth being developed and retained for quite a long period after birth, but finally replaced by the permanent set. But in the Pinnipedes, or swimming Carnivora, viz., seals, walruses, etc., the milk-teeth are extremely rudimentary, and are replaced before or immediately after birth by those of the permanent series.

In the Cetaceans, but one set of teeth has been found, and it is more than probable from the phases of development in allied types that this represents the permanent set of the typical mammals, the first set being suppressed or abortive.

In Rodents, the great incisor teeth are permanent, and growing from persistent pulps; they have, as a usual thing, no deciduous predecessors.

This diversity, which we have recognized in the manner of development and number of teeth, we see also in their shape. We have Homodonts, or animals with teeth quite homogeneous in shape, and Heterodonts, those having teeth of dissimilar shapes, the large majority of mammals being Heterodonts. The evidences strengthening the belief that all the teeth of mammals are but modifications of a single typical form are fast accumulating; and, though the distinction between incisors, canines, pre-molars, and molars seems at first sight marked, a closer inspection reveals various transitional characters linking them together.

A word of repetition, now, respecting the blending of dental peculiarities in the different species of animals.

The Cetaceæ, as a rule, have but one set of teeth. The narwal, and some others, have a temporary set in fœtal life, functionless and abortive.

The sperm whale has, it is supposed, but one set; if more than one, the first is functionless and abortive.

The Balænidæ, or whale-bone whale, has a set in embryo, which is absorbed before birth, hence functionless and abortive; after birth the great baleen plates are developed.

The aquatic Carnivora, seals, etc., have the first set quite functionless, it being absorbed immediately after birth, resembling in this the Cetaceæ.

Ruminants, as a rule, have no superior permanent incisors or canines, yet some have functionless and abortive ones.

The male musk-deer has permanent upper canines, and the camel has permanent upper incisor teeth, though these are both ruminants.

Rodents have their incisors growing from permanent pulps; as a rule these have no deciduous predecessors, yet rabbits and hares, Rodents as they are, have two small functionless ones back of the permanent.

Now, recognizing this great diversity, and considering this blending of the varieties of teeth in the matter of their development, morphology, number, and function, all within the same order of animals, and that order, Mammalia, fixed and complex as they are in their tendency, we certainly have indications of their origin from a common ancestral form, and a unity of organization, modified though by natural selection, sexual selection, and concomitant variation; these influences all active in correspondence with surroundings or environment.

This theory of descent seems to offer a rational explanation for the presence of those remarkable rudimentary organs,—eyes that see not, and ears that hear not, as well as muscles, rudimentary and functionless; and by this same theory we may be able to explain the mysterious relations of innumerable organic forms to each other. Their mutual resemblances are but the natural consequences of an inheritance from a common ancestral form, and their differences are but the necessary effect of an adaptation to the environment or different conditions of existence.

The address, of which this is but a very imperfect synopsis, was fully illustrated upon the blackboard, and with a variety of skulls from the museum of the Pennsylvania College of Dental Surgery.

Dr. W. G. A. Bonwill read a paper, entitled "The Science of the Articulation of Artificial Dentures," of which the following is an abstract.

The speaker commenced by expressing an opinion that the science of mechanics constitutes the basis of that which is properly called dentistry, and that the operator rises to the dignity of an artist when he has learned to combine the useful with the beautiful by correct articulation, and the restoration of expression in dental prosthetics. It is not enough to know how to fit teeth so accurately to the plate that they shall be water-tight, or to polish the plate so beautifully that the tongue can find no fault with it, nor yet that the denture shall fit so accurately as to leave nothing more to be desired in that respect. Unless there is something beyond all this, we are guilty of placing "false teeth," as they are frequently and too truly called, in the mouths of our patients. Teeth may be never so elegantly shaped and colored, yet, if not adapted to the individual case, or if unskillfully set on the arch, they will be artistic failures.

Regretting his inability, for want of time, to dwell upon the art features of the subject, the speaker desired to ask attention to a new device for articulating teeth, founded upon exact principles, which he believed when observed must result in the production of satisfactory results. He (the speaker) had followed this system for at least seventeen years. He preferred the term articulation to occlusion, because it better expressed the movements of the jaw in its natural functions. Before we can comprehend what constitutes true articulation of artificial teeth we must understand the anatomy of the human jaw and its functions.

We find from fourteen to sixteen teeth in each jaw, arranged in such manner that no two strike directly against each other. In ninety-five per cent. of cases the upper teeth project over the lower, the depth of overlap varying according to the depth of the cusps of the bicuspids; the ramus of the jaw, also, curving upward and backward in relative proportion to the length of these cusps. From one condyloid process of the lower maxilla to the other is about four inches. From these processes to the median line is also four inches. These measurements vary slightly, but never more than one-fourth of an inch. Under any other arrangement the teeth would have to be flat on their grinding surfaces to admit of lateral movements, and would not admit of the normal curvature at the ramus designed for equalizing the force applied to the teeth. The triangular formation brings into contact the largest amount of grinding surface of the bicuspids and molars, and at the same time allows a free action of the incisors during lateral movements, the bicuspids and molars being in nearly a straight line from the cuspids to the condyloid processes.

Another important point is the relation of the upper to the lower incisors, the overbite of the former giving in the lateral movement of the jaw the effect of scissors in cutting the food. When the incisors strike directly upon each other, their cutting-power is very materially lessened.

In reference to the law of proportion between the depth of the overbite and the depth of the cusps, it can easily be told from the depth of the cusps of a bicuspid tooth whether the jaw from which it came had much or little overbite. Where there is no overbite there is no occasion for cusps, and if originally there, they are soon worn off.

The law of articulation, already alluded to, of a curvature of the lower jaw at the ramus, and correspondingly of the upper jaw, relatively to the overbite, shows a wise provision for insuring proper movements for perfect mastication.

The general law to which allusion has already been made, and which holds good in at least ninety-five per cent. of cases, determines that according to the overbite of the incisors, the teeth posterior to the cuspids will show a depth of cusp shorter in proportion to the incisors' overbite toward the condyloid processes. At the same time the other law referred to arranges the bicuspids and molars in a curve from the cuspid as far from a straight line drawn from the cutting edge of the centrals to the highest point of the last molar in position as is the depth of the overbite at the incisors. We should remember these laws when we come to place artificial teeth on a plate. If they are ignored we cannot get the proper lateral movements, nor carry out the plan of nature, as shown in the arrangement of a natural denture. Types and forms may vary, but the general law holds good.

These laws must be appreciated and observed in the arrangement of all artificial dentures. Most operators seem to have constructed artificial dentures under the impression that it was only possible to secure the up-and-down movement in mastication, not providing for any lateral motion. The horseshoe arch has been adhered to from the fear that if the molars were placed outside the arch the plate would tilt and render mastication impossible. If an overbite were provided for, the arch has been made larger than normal in order that in lateral movements the lower teeth would not touch the upper for fear of displacing the plate. It has been taught that the cusps of the antagonizing surfaces must on no account be ground; that but one side or cusps of the bicuspids and molars could be made to antagonize,—the outer side.

It will be observed that, in making a lateral movement of the lower jaw to the left, the condyle of the left side does not move backward, but merely rotates slightly in its socket. The right condyle moves forward in the glenoid cavity fully half an inch when at its farthest limit, causing the outer cusps of the upper teeth, from the centrals to the last molars, to touch the outer and inner, or buccal and lingual, cusps of the lower on the same side,—the left,—while on the opposite side we find only the inner cusps of the bicuspids and molars of the upper teeth in contact with the outer cusps of the lower, the incisors not touching at all. The reason why there is so little contact of surfaces on the right side, when the lower jaw is thrown to the left in mastication, is, that the food being on the left side, there is no necessity for much contact on the right, but some contact is necessary in order that the muscles of both sides should act in harmony. If there were no contact on the right side during mastication on the left, we should have produced that looseness at the condyloid processes which makes it so difficult to furnish a satisfactory denture for those who have lost all the grinders on one side.

The speaker proceeded to show how the triangular form of the lower jaw alluded to was necessary for giving the largest number of muscles a chance to act on both sides simultaneously, and for equalizing the pressure on all sides. And again, how it gives an extra motion backward when the lower teeth are brought in contact with the upper to incise or cut off food.

Having studied the exact shape of the jaw, the philosophy of its form, and its adaptation to the functions for which it is designed, we should have at our command an articulator, so nearly resembling it in form and movements that we can test our artificial dentures upon it, and procure, at least approximately, the effects which will be desirable in actual use.

Dr. Bonwill then exhibited an articulator which he claimed to be made in imitation of the form and to so combine the movements of mastication, and so arranged that with one base any number of sets or partial sets could be articulated upon it without destroying the original plaster-bite. He claimed that the bite is as important as the impression, there being no more room for guess-work in the one case than in the other. He advised that for full sets the upper wax should always be modeled first, judging of the length of the incisors, as well as of their shape, width, and color, by trial under the lip. The length of the incisors being decided upon, one is enabled to judge how deep an overbite to make, and thus to get the height of the lower wax.

The modeling of the wax on the upper plate must depend upon the artistic taste of the practitioner. It must be rounded here and flattened there until his judgment tells him it is correct. A good plan in trying teeth in the mouth is to stand on both sides as well as in front of the patient, who should be drawn into conversation, caused to smile and to laugh, in order that the play of the muscles and the varied expressions of the countenance may be observed. The cuspids should stand out more prominently than any other teeth, while the superior first bicuspids should nearly always fall somewhat behind the cuspids. If one cannot make a good joint or preserve the contour of the artificial teeth and still produce a proper effect, better let these minor mechanical details be sacrificed rather than the *general effect.*

Having arranged the upper wax and teeth, the same rules apply to the lower. The lower teeth should be made to conform to the upper, and if this cannot be done without modification of the upper, then some change in the latter becomes necessary. The length of the molars should be equalized on the upper and lower plates. To have the patient talk, smile, and laugh will be a valuable assistance at this point. Mark carefully the median line, and the plates are now ready for articulation.

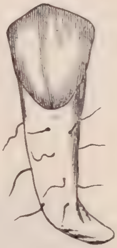
[The remainder of Dr. Bonwill's paper consisted of minute directions for the use of a special articulator, a report of which would not be intelligible without illustration, and is therefore necessarily omitted.—EDITOR DENTAL COSMOS.]

The secretary then read the following paper on "Certain Defects in Dentine; their Relation to Exposure of the Pulp and Peridental Inflammation," by Dr. J. Edw. Line, Rochester, New York:

Last fall it was our privilege to attend a union meeting of two of our district dental societies, and while there to listen to Dr. W. C. Barrett, of Buffalo, N. Y., who gave the history of a somewhat remarkable case. We repeat the history, without, so far as we know, a single important omission.

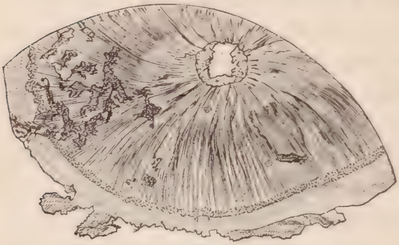
A lady called on him for advice in regard to a lower bicuspid tooth that had given her much trouble. In his examination he found the tooth somewhat decayed, very tender to the touch, and surrounded at the neck by pus that had worked its way from between the tooth and walls of the alveolus. She told him that the pulp had died some years before, that an abscess had developed, that the root had been filled, and that since then she had had no peace. She was anxious to save the tooth, but unwilling to suffer longer. The doctor suggested extraction and replantation. She fell in with his suggestion, and the tooth was taken out. He found the surface of the root granulated, the terminal fourth bent at an angle of about forty-five degrees, the canal filled with cotton. He filed off the root at the bend, removed the cotton from the pulp-canal, filled with a chloroform solution of gutta-percha, and returned the tooth to its place in the jaw. While the introduction of the solution of gutta-percha was in progress, *the material issued in fine threads from at least ten minute openings on the surface of the root.* Some of these threads of gutta-percha were plainly visible to the unassisted eye; others called for the use of a magnifier. (Fig. 1.)

Fig. 1.



Nothing whatever is known of the nature of the channels by which the gutta-percha passed from the pulp-canal to the periphery of the root. The following are, however, among the possibilities: (1) This tooth had numerous foramina—many lateral and one or more apical—for the passage of vessels, or vessels and nerves, and by way of these the material reached the surface. Tomes says, "In a few cases, canals for the passage of vessels may be found entering the pulp-cavity through the side of the tooth, midway between the neck and the apex of the root, while in a few others they enter by several minute canals." (2) The material entered unusually large dentinal tubuli, followed them to the interglobular spaces, thence to the surface of the root through chains of lacunæ in the cement. We know from personal experience that a chloroform solution of gutta-percha, also an alcohol solution of shellac, can be forced some distance into the tubuli of very young or immature teeth; but that these solutions may reach the surface of the root, additional openings must be had to complete the route. Such additional openings may be found in lacunæ, or in abnormal excavations, or both. We have specimens in which the lacunæ are unusually large and numerous, and which interlace and anastomose quite freely; and other specimens in which there are abnormal excavations in the cement, some of which communicate with similar excavations in the adjacent dentine. To fill such lacunæ and excavations with gutta-percha and shellac solutions is certainly among the possibilities. The readiness with which some materials flow into and obliterate cemental lacunæ is well known to those who have had practice in preparing and mounting sections for the microscope. Canada balsam is, perhaps, the most familiar example of materials that act in this manner. (3) The dentine, also the cement, were honeycombed in all directions, filled with cavities previously occupied by organic, or organized, matter. The gentleman who gave the history of the case under consideration says this tooth is by no means the only one that has in his hands exhibited honeycombed characteristics. He has forced gutta-percha into the body of the dentine of young or immature teeth time and again; in some instances to a considerable depth, in others to little beyond the limits of the pulp-cavity. In his closer examination of teeth treated in this manner, he found some with cavities in the dentine filled with gutta-percha, whither the material had made its way from the pulp-cavities through large dentinal tubuli or minute canals.

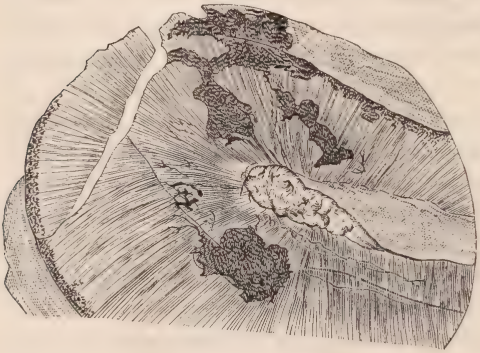
FIG. 2.



(Chase Coll., No. 241.)

In the absence of knowledge of the nature of these defects—the channels by which the gutta-percha made its exit from the pulp-cavity,—we incline to the belief that this tooth was honeycombed throughout; that chains of cavities in the dentine and cement constituted the routes by which the filling-material was enabled to exhibit itself at the periphery of the root in thread-like exudations. The following will explain what we mean by *honeycombed:* Several of a dozen specimens of teeth, mounted for the microscope by a gentleman well known to the profession as experienced in such matters, and kindly sent us for examination, exhibit in a remarkable manner a radical departure from normal structure in dentine, and which we now believe more common than has been generallysupposed. One of these specimens (Fig. 2) is a transverse section of the root of a bicuspid tooth from a thirty-year old subject. Under an inch objective irregularly outlined patches are seen in the dentine, two or three of which extend

FIG. 3.



(Chase Coll., No. 462.)

into the cement. When the specimen is within or beyond the focus of a three-tenths objective the dark patch appearance is much more striking; but when this objective is carefully focused the dark patches are resolved into cavities filled with masses of nucleated cells. Another specimen (Fig. 3) exhibits the same phenomena, but on a more extensive scale. In this the cavities are seen to communicate on the one hand with the pulp-canal, on the other with the alveolus of the tooth. Their contents have been described as "absorption cells," which they may be; or, as suggested by Salter, they may be masses of tissue entangled during the development of the tooth, and possibly capable of exercising the function of absorption.

Whatever the nature of the channels in the tooth whose history opens this paper,—whether lateral canals, unusually large dentinal tubuli, chains of lacunæ, cavities in dentine and cement, or combination of two or more of these elements, they cannot be classed as other than defects—defects principally of dentine. It is certain that the material passed through channels of some kind. It is also certain that lateral canals are very rare, and in any individual case few in number; and as tubuli large enough to permit the flow of gutta-percha are found only in very young or immature teeth, and lacunæ are limited to the cement, we are left with cavities—abnormal excavations—in the substance of the tooth as the probable course of the gutta-percha from the pulp-cavity to the surface of the root.

The relation of such defects to exposure of the pulp is unquestionable. It is of course impossible at the present time to give the probable proportion of teeth in which they exist; but that their number is greater than has been generally supposed may be asserted with perfect safety. Only a few days ago we had occasion to remove a large amalgam filling from an upper molar on account of breakage of enamel at the margins of the cavity. Opposite the lower portion of the pulp, and connecting the pulp-cavity with the cavity of decay, was a small opening that had existed for months, perhaps years. It could not have been there when the tooth was filled, for it is anything but reasonable to suppose that a dentist, even a moderately slovenly one, would fill a tooth the cavity in which communicated with the pulp-chamber by an opening at least one-sixteenth of an inch in diameter and in full view. As to how it came there the usual explanation would be—too little tissue between the two cavities to begin with, and absorption by the pulp induced by thermal changes. Possibly that explanation is sufficient. But the channel was long, tube-like. That it was formed by the pulp, we must suppose that organ to have sent out an arm or shoot, and have kept moving it until the filling was reached. We must suppose further, that this arm or shoot was subsequently withdrawn, absorbed, or reduced to pus. This is not an isolated case by any means; it is typical. We recall several cases in our own practice where we had excavated with great care, and were fully satisfied that the pulp, though not far off, was not exposed. Years after, we found suppurating pulps or empty pulp-cavities, and in every case the pulp-cavity some distance from the cavity of decay, the two being connected by a channel-like opening whose walls were at right angles, or nearly so, with those of the pulp-chamber. The notion of a proliferating pulp in all these cases is anything but reasonable; while the notion of cavities in the dentine, such cavities containing tissue capable of exercising the function of absorption, and under extreme irritation undergoing decomposition, seems quite the contrary. To illustrate: suppose we fill a tooth with gold, leaving one-thirty-second to one-sixteenth of an inch of tissue between the filling and pulp. Suppose, further, that there are cavities, such as are shown in the cut, in this thin wall of tissue. Thermal changes conducted by the filling irritate the contents of these cavities to death; the products of decomposition in their efforts to escape, in turn irritate the pulp; the filling is removed, and an opening formed that had no existence at the time the operation was performed.

These cavities in dentine may also explain why it is that decay at times travels by long and out-of-the-way routes to communicate with the pulp-chamber.

Again, peridental inflammation may, and it seems to us does, arise in certain cases from the death of the contents of these cavities. It has happened in the practice of every dentist in the land, whose business includes the filling of roots, that at some time subsequent to the filling of a root, notwithstanding much time and care were taken to insure success, peridental inflammation has set in and all but ruined an otherwise perfect operation. Suppose we remove the pulp of an incisor. We then fill the root perfectly, taking care that the material neither falls short nor goes beyond the end. Everything points to success. In a few days, however, the tooth grows tender; it feels longer than common; things continue to grow worse; the end is an abscess. It is hard to attribute this failure to manipulation, and yet this is precisely what is done in nine cases out of ten. If we extract a few such teeth, soften and slice them with a razor, we will find in some of them things that we thought not of. Here and there in the substance of such teeth will be found cavities that formerly contained tissue abounding in cells, but now filled with pus,—veritable cases of "abscess in dentine." This matter, unable to get into the pulp-cavity and thence into the mouth, was compelled to flow the other way. In its course it set up irritation in the peridental membrane, then inflammation, with the appearance of pus at the neck of the tooth, or the formation of a sac at or near the apex of the root.

The cases of "abscess in dentine" described by Bell, Bates, and Tomes, direct attention to conditions not dissimilar to those already noted. Bell says of his case, "As no diseased appearance was found on the surface, I sawed it asunder at the crown, and found a cavity in the solid bony structure, perfectly circumscribed; the surrounding bone being white, and of a healthy and sound texture." In Bates's case, "External to the pulp-cavity, and having no connection with it, there was, in the palatal fang, a cavity containing pus—'abscess in dentine' . . . Though there was no communication with the pulp-cavity, there was a small orifice opening to the periosteal surface." Tomes's cases were "circumscribed cavities in the tusks of elephants."

The following paper was read by Dr. Louis Jack, of Philadelphia, on the "Treatment to Correct the Consequences of Premature Loss of the Deciduous Cuspid."

In the usual order of development of the first bicuspid and permanent cuspid, the former tooth appears soon after the shedding of the first deciduous molar, at near the age of twelve years of life, and previous to the loss of the cuspid, by a period of from several months to a year.

While the deciduous cuspid is still somewhat firmly fixed the bicuspid is assuming its proper position, and is having its alveolus builded about it before the presentation of the permanent cuspid.

Any irregularity of development which shall induce the reversion of this order constitutes the peculiar condition which it is here proposed to describe and to consider the treatment of.

When, from either accident, natural causes, or injudicious surgical interference, the deciduous cuspid has been removed long previous to the orderly time for its loss, it is scarcely possible for the child to escape a serious irregularity in the process of eruption, finally requiring difficult and uncertain treatment.

It would appear that there is an increasing frequency of this form of irregular development occasioned by the natural loss of the first cuspid in advance of its period, accompanied usually by a crowded relation of the incisors, consequent upon the small-sized maxilla and undeveloped alveolar border, quite common to the pampered children of modern civilization.

But whether the premature loss of the deciduous cuspid is due to the unusual stimulus caused by the lateral pressure of the crowded incisors, or by too early extraction, the general result upon the development and advancement of the permanent cuspid is similar. It is determined to appear before any considerable absorption of the deciduous first molar, and therefore much in advance of the eruption of the first bicuspid.

The effect of the removal of the upper cuspid, at this early age, to relieve the irregular position of the incisors cannot have escaped the notice of many careful observers. The usual consequences—whatever they might be in the case of a healthy child of vigorous constitution and excellent nutritive functions—are an anterior relative position of the first deciduous molar,—it not infrequently being in near contact with the lateral incisor,—and some depression of the incisors; and a contraction of the parts, which would seem to be attributable to a tendency to depauperation of passive organs, because of the low grade of the vital functions. This disposition appears to be inseparable from cases of inveterate dental irregularities.

The natural law should have an entirely different expression. When development of one structure takes place, there would be concordant development of the related tissues, if there were not existing retrograde tendencies.

At a variable period, as was said above, the permanent cuspid threatens to issue at a point usually forward of its proper place, being deflected in this direction by the crown of the first bicuspid, which is still beneath the gum upon which the posterior portion of its inner surface rests in the infant mouth, and as it comes through, it bears upon the lateral incisor, depressing this as far as the lower teeth will permit.

From the general physical condition accompanying these cases, decay of the lapping teeth is imminent.

In the lower maxilla the results are in general similar, with the important variation that the incisors fall inward to an alarming degree, often so much so as to deprive them of their function, driving the little subject to the use of the side teeth for the prehension and cutting of the food. The loss of the lower deciduous cuspid by natural causes is so rare as to be scarcely observed; it follows, therefore, that corrective treatment of the lower teeth must be for injudicious interference.

The treatment generally pursued of this form of irregularity has been of an expectant nature. The cuspids are usually permitted to remain in the distorted position until after the arrival of the first bicuspid, with the trust that sufficient enlargement of the arch may take place to permit correction, and if this fails, to then remove the first bicuspids.

There are several serious objections to this course, if the cuspid is to remain long in the position indicated above, namely, the unsightliness of the irregularity, the danger of carious action at the points of contact, and the troublesome, tedious, and rarely satisfactory efforts to induce the cuspid to retire into the position of the first bicuspid. The movement required to correct this irregularity is antagonistic to the forces which govern the eruptive motion of the teeth, for this reason: the perfect placement of the cuspid in a position distal to the one in which it has become fixed, can be attained only by the long-continued application of considerable force. This difficulty is more marked in the teeth of the lower maxilla.

A better mode of treatment is to remove the deciduous first molar, when the necessity arises for some action, and to follow this by seeking for the first bicuspid at its position among the tissues, and immediately removing it. This operation at first sight appears to be a formidable one, but when the anatomy of the parts is reflected upon, it is seen to be feasible and not difficult. It is one requiring careful performance, and should be attempted only by those who are familiar with the relations of the parts involved.

The place of the first bicuspid at this time is immediately above the first temporary molar, and but little distant from it; the position of its root inclined somewhat posteriorly; and the crown very near the outer plate of the alveolus. As the bicuspid nears the gum, the alveolar border is absorbed, and its crown will be found free on the outer side.

There is found immediately beneath the deciduous tooth the absorbent papilla, and generally below this, contrary to what one would expect, a partition of alveolar tissue, which usually follows up the process of absorption, hence placing a moderately thick septum between the two teeth; in others, where the advancement of the new tooth is rapid, it carries with it the corona of its crypt. In cases where the molar tooth is found to be dead, or the absorption of the dentine of the molar nearly complete, there is direct communication with the bicuspid, when it will almost drop from its crypt, so easy is the displacement.

To facilitate easy access to the imbedded tooth and to readily secure its removal, it is preferable to divide or break down the outer border of the alveolus, which supports the deciduous tooth, when with a pair of delicate and thin-bladed forceps or by means of an elevator, the tooth is easily taken away.

Dexterity and not force is needed, because the attachment of the tooth is but slight, the septæ not being in close contact, and the root being still short.

It is important that but little upward force be employed and as little laceration of the tissues caused as possible.

The patient should be placed under the influence of ether, since it would be out of the question to attempt this operation for so young a child without absence of sensibility. Preference is to be given to ether over nitrous oxide, because, while the operation does not require much time, it is important that the operator should not feel under the necessity of making any haste in the performance, which is almost inseparable from the use of nitrous oxide.

It remains to consider the time when this operation should be performed.

In cases where the indications are that the bicuspid will appear within a few months of the first presentation of the cuspid, it would be preferable to pursue the usual plan and await natural loss of the first deciduous molar; this insures the close proximity of the bicuspid. In other cases where the indications are that the difference in time may be one to two years, the mouth should be closely watched, and the bicuspids found and extracted when the cuspids appear half their size.

There are so many qualifying conditions that it is difficult to lay down definite rules for the time at which to interfere. In some cases I have acted before the cuspid had penetrated the gum, when it was presenting much forward, and when the molar was in contact with the lateral. Again, when the molar was one-third the breadth of the cuspid from the lateral, I have waited as long as seemed safe for the interests of the patient.

I would, however, express the caution that the natural tendency to delay be resisted.

In the case, the cast of which attends this, the deciduous molars were in contact with the laterals. The first bicuspid was sought for and removed before the cuspid had penetrated the gum. There was no other treatment whatever, and in the course of a few months the cuspids assumed the place they at present have.

It will be observed this cast exhibits a symmetrical and regular arrangement of all of the teeth. It is presented here because it typifies the above description and treatment.

The following officers were elected for the ensuing year:

President.—Dr. C. N. Peirce.

Vice-President.—Dr. T. L. Buckingham.

Recording Secretary.—Dr. J. W. Adams.

Corresponding Secretary.—Dr. W. R. Millard.

Treasurer.—Dr. Wm. H. Trueman.

Executive Committee.—Dr. E. H. Neall, *Chairman;* Drs. S. H. Guilford, W. R. Millard, G. W. Klump, and R. Huey.

On motion, adjourned.

J. W. Adams, *Secretary pro tem.*

NEW YORK ODONTOLOGICAL SOCIETY.[1]

(Continued from page 283.)

The following paper, entitled "Patent Rights and Copyrights in their Relation to Professional Ethics," by W. F. Litch, D.D.S., of Philadelphia, was then read:

The "Code of Medical Ethics" says that "It is derogatory to the professional character, for a physician to hold a patent for any surgical instrument or appliance." The justice of this provision is often called in question, even among physicians, and there is in regard to the principle involved a still wider diversity, not only of opinion, but of action, in our own profession. In view of this fact I have thought that a brief time might be profitably spent in an analysis of the reasons upon which the ethical law in question is based.

To such dental practitioners as deem themselves bound by the laws which general practitioners of the healing art have established for their governance, my arguments in favor of the essential justice of this law will be chiefly addressed; others may find in them but little force or cogency.

In order to a more just and a broader comprehension of the subject, it would, perhaps, be well to review, briefly, the origin and growth of this system of exclusive privilege codified in those laws of patents now common to all civilized nations.

"Letters patent," says Coryton in his "Treatise on the Law of Patents," "are so called from the form of the grant, which is in open letters (*literæ patentes*), addressed by the sovereign to the subjects at large."

And the same writer goes on to say: "'Letters patent' for inventions are grants of record under the great seal, whereby, in consideration of the improvement effected by such invention in trade, the exclusive enjoyment of such improved trade, for a limited period, is assured to the parties first communicating the invention to the public." . . . "The earliest instance of the exercise of this authority has never been accurately ascertained. We find, however, in the reign of Edward III., that on representation to him of the feasibility of making a 'philosopher's stone,' that monarch issued a commission of two friars and two aldermen to inquire into the matter, and, on their reporting in its favor, granted to them and their assigns the sole privilege of making the philosopher's stone."

By degrees, however, this prerogative of the crown was employed in sanctioning, in return for pecuniary aid, individuals and corporations in very oppressive monopolies. In the reign of Elizabeth this evil had assumed formidable proportions.

"It is astonishing," says Hume, "to consider the numbers and importance of those commodities, which were thus assigned over to patentees. Currants, salt, iron, powder, cards, calf-skins, fills, pouldavies, ox shin-bones, train-oil, bits of cloth, potashes, anise seeds, vinegar, sea-coals, steel, aqua vitæ, brushes, pots, bottles, saltpetre, lead, accidences, oil, calimine stone, oil of blubber, glasses, pipes, starch, tin, sulphur, new drapery, dried pilchards, transportation of iron ordnance, of beer, of horn, of leather, importations of Spanish wool, of Irish yarn." . . . "These monopolists were so exorbitant in their demands that in some places they raised the price of salt from sixteen pence a bushel to fourteen or fifteen shillings. Such high profits, naturally, begat intruders upon their commerce; and, in order to secure themselves against their encroachments, the patentees were armed with high and arbitrary power by the council, by which they were enabled to oppress the people at pleasure, and to extort money from such as they thought proper to accuse of interfering with their patent. The patentees of saltpetre having the power of entering every house, and of committing what havoc they pleased, in stable, in cellar, or wheresoever they suspected saltpetre might be gathered, commonly extorted money from those who desired to free themselves from this damage or trouble, and while all domestic intercourse was thus restrained, lest any scope should remain for industry, almost every species of foreign commerce was confined to exclusive companies, who bought and sold at almost any price they thought proper to exact."

It was not until the repeal of these unjust laws, in the reign of James I., that any special protection is known to have been thought of for inventions and discoveries in arts or manufactures; and, up to a very recent period, the laws of the United States, imperfect as they are, have, in point of liberality and justice, been far in advance of the mother country. And, although the entire system is by many strenuously opposed, as in opposition to all sound maxims of political economy, as restrictive of that unrestrained freedom of trade which is so essential to commercial prosperity and national advancement, as taxing the many for the benefit of the few, and as conferring privileges of a value often far in excess of the service for which they are designed to be a reward, still there can, I think, be no doubt that justice and policy alike sustain the wisdom of existing regulations upon the subject, in their general features and in their application to the general public. Upon this point Coryton has this to say:

"Assuming the policy of rewarding inventors by the state, and this is the side on which the question receives its general support, a judiciously limited monopoly in the advantages of a discovery is not only the most appropriate and economical, but by far the most effectual encouragement, in the great majority of improvements. Without such protection it is clearly the interest of every one who has made a discovery available in trade to conceal it from the public, and, notwithstanding the difficulties attending such concealment, they are not insuperable when the ingenuity of invention is diverted to devise methods of concealment."

But, while admitting the justice of the principle upon which our patent laws are based, it may be well to note the conditions and limitations upon which "letters patent" are granted. One essential condition is, of course, that the thing patented shall be, in good faith, the invention of the patentee, and not of another; and, secondly, that all processes and details essential to the production of the invention upon which "letters patent" are granted shall be fully specified and made known to the public. The limitation is that the monopoly shall be only for a limited number of years, and not *in perpetuum.*

"An exclusive privilege," says Newman in his "Law of Patents," "can only be justified as a reward to him who adds to the general stock of knowledge. . . . It is therefore a condition of such grant that the grantee shall fully discover his invention." "These privileges are granted," says another writer ("Law Dictionary"), "on certain conditions, among which is the one of at once giving up his secret and making public his discovery or invention, and the manner of making and using the same, so that at the expiration of his privilege it may become public property." Webster, in his "Law and Practice of Letters Patent for Inventions," says, "The monopoly should only be temporary, for the inventor has no natural or inherent right in his invention, and it would be unjust and injurious to exclude the public for any great length of time from a branch of useful trade newly opened to them." But, as a broad and discriminating statement of the true relation of the inventor to his invention, as well as to the public, I cannot do better than to quote a portion of the admirable treatise of Frederick Edwards, Jr., on "Letters Patent for Inventions:"

"It may be stated broadly that the inventor is supposed to investigate and understand certain laws and principles of nature, and to be intimately acquainted with the use of certain materials or products. He discovers by reason, by experiment, or by chance, that those laws can be so applied to certain substances as to produce a result which is new to him, and which may be beneficial to mankind. He therefore asks for protection to use his discovery, and it is called his invention. The more intimate he is with nature, and the more carefully he considers his knowledge with reference to any subject of investigation, the more probable it is that he will gain a particular end in a very complete manner; and the more completely he succeeds, the more certain is it that if any other man of equal knowledge, equal capacity, equal opportunities, and working with equal care and perseverance investigated the same subject he would arrive at the same or equivalent results. . . .

"The history of invention has been said to be the history of simplification, which can merely mean that the discovery of one man is followed by the discovery of another, and it implies that nature offers very perfect modes of doing things, but that what is most particular to man is his partial insight, his hopes, his struggles, his disappointment, his vexation, and his loss. . . . It appears, therefore, that those who believe the inventor to have a natural right to the exclusive use of his discovery, and that his invention is, in fact, his property, which should be protected by legal enactments, must have an entire misconception as to what it is the inventor really achieves. If he produced a work of art which could by no possibility be the work of any hand but his own, there could be no question as to his right; but if he anticipates discovery, if any other man with equal attainments or with equal advantages may make the same discovery, if, indeed, one or many others do, unknown to one another, make the same discovery, his merit consists essentially in priority,—often a very great merit indeed, and one for which there should be adequate reward, but still one that does not entail any notion of the right to exclusive possession."

Having thus briefly reviewed the history and considered the philosophy of that system of monopolies known in our day as patent rights, having admitted its essential justice as applied to the lay public, we have next to discuss the reasons underlying those ethical restrictions imposed by the medical profession, by which its members are morally debarred from sharing in common with their fellow-citizens at large the pecuniary benefits arising, or which might arise, from monopolies upon the manufacture and sale of any contributions which they may have made to the already large and rapidly-increasing list of surgical instruments and appliances.

First, we may remark that those restrictions are peculiar to the medical profession, because, of the three recognized "learned professions," Medicine alone is wedded to mechanics pure and simple. Law and Theology deal only with abstract thought, with those intangible principles governing men in their relations to each other, to society, or to the Deity; while Medicine has for its sole aim the preservation of that most delicate, most complex, most wonderful mechanism, the human body. And so every year is bringing to instructed practitioners of the healing art a truer realization of the nature of their task, a clearer conception of the fact that disease is a question of dynamics, and not of miraculous interposition or blind and inexplicable chance; that the throbbing of each artery, the strange cunning of each organ in its mysterious manifestations of functional power,—so faithful in its service, so discriminating in its intelligence that each seems endowed with thought apart from that general consciousness which we call mind,—that every manifestation of vital power is, I say, as much a matter of mechanical law or of chemical change (which is but another form of mechanics) as the automatic movement of the steam-engine, or the rhythmic pulsings of worlds and suns, planets and satellites in that unfathomable vastness through which we float as thinnest spray tossed from the billows of an infinite ocean. And thus understanding the truth that the normal manifestations of vital functions are made in obedience to fixed mechanical laws, the corollary to that truth is also recognized, that functional aberrations can be remedied only through the same agencies. Thus every year there is less and less faith in the blind deglutition of the bolus, the mixture, and the pill, whose supposed efficiency in years gone by seemed so largely dependent upon their intrinsic nastiness, and which was certainly often as far apart from any accurate notion of the true nature of their constituents as it was from a scientific apprehension of the nature of the diseases which they were intended to remedy. Medicine to-day is not firing so wildly or at so long range as it was even a quarter of a century ago; it is getting at close quarters with disease. The sphinx is opening her lips, and science to-day stands eager, questioning, "In what is that secretion or excretion lacking, and how shall it be restored?" "With what foreign elements is it contaminated, and how shall they be eliminated?" "What is the force of this arterial current beating in upon and hourly widening this inflamed area, and to what degree shall I subdue its violence with sedatives or depletory agents?" The physician to-day does not guess what is the matter with the eye or the larynx, he looks; he does not surmise the existence of lesions in heart or lung, he listens and explores and thus knows; he does not rudely reckon the character of arterial action or the extent of thermal aberrations, he accurately measures; and so in every direction mechanics come to his aid; he becomes a deviser of cunningly constructed appliances to assist him in his task of exploration, diagnosis, and treatment. We have laryngoscopes, stethoscopes, ophthalmoscopes, sphygmographs, and a large list of other instruments for securing precision in diagnosis, besides an innumerable company of instruments and appliances used in the domain of general surgery; indeed, so numerous and so constantly in demand are they that hundreds of workmen are engaged in their manufacture and large ware-rooms devoted to their sale.

So it will be seen that the question of monopolies upon mechanical inventions becomes of high practical importance to the physician and surgeon. Medical science needs inventions and uses them; why should she not be willing that the physician-inventor should be recompensed through the same agency as that by which the lay-inventor is remunerated,—that is, by the granting for a term of years an exclusive privilege for his invention?

In the Code of Ethics, the holding of a patent by a physician and the trafficking by him in secret nostrums are alike condemned, but not in the same terms; the holding of the patent is denounced as derogatory to the professional character, while of the dispensing of the nostrum it is said that, if it "be of real efficacy, any concealment regarding it is inconsistent with beneficence and professional liberality; and if mystery alone gives it value and importance, such craft implies either disgraceful ignorance or fraudulent avarice." But, in fact, the patent-right monopoly and the concealment of the ingredients of the nostrum are identical in their results; the effect of each is to restrict the use, and thus the usefulness, of the remedy concealed or the instrument or appliance monopolized; and thus both are alike "inconsistent with beneficence." The patentee can of course say, "I do not restrict the use of my invention; on the contrary, I am only too glad to have it used by any one who will pay my price;" but the nostrum-vender can say as much, and with just as little reason. There is, I am aware, an apparent and perhaps a real inconsistency here, because steam-engines, sub-soil plows, power-looms, sewing-machines, and the tens of thousands of devices intended to facilitate man's labors, to lighten his burdens, and enhance his comforts and enjoyments, are so many direct sanitary agencies, in the aggregate far more potent in baffling disease, promoting the growth of populations, and prolonging the average of human life than all the surgical appliances ever invented or drugs ever administered; and logically, therefore, restrictions placed upon one class of inventions are quite as "inconsistent with beneficence" as those placed upon the other. But, whether logically or not, I think that most men instinctively recognize a distinction between the two cases. There is a sanctity, born of the imperishable bond of human brotherhood, thrown around the man struggling in the strong grasp of the common enemy; what as between man and man under ordinary conditions would be recognized as perfectly fair and legitimate, becomes inexpressibly loathsome as between man and his brother suffering the sharp pangs of disease. It is the difference between standing on dry land and selling a man a boat in which he may sail, and higgling as to the price of a life-preserver while he is drowning in the stream. This instinctive, and, if you will have it so, illogical prejudice, will probably always be operative with all humane men so long as there is disease and suffering in the world; certainly it will never cease to be operative with the true physician. But to the physician as such, there are other considerations, apart from this, upon which the ethical restrictions we have under consideration are largely based. They are found in the demands of that dignity which should illustrate the liberal character of his profession, and that true fraternity which should emphasize and strengthen the professional bond. To both considerations physicians owe high and unfaltering allegiance.

First, then, as to the character of the medical profession. It is essentially a learned and therefore a liberal profession, its followers being, presumptively, liberally educated men. We need hardly trouble ourselves to analyze the nice distinction between a learned or liberal profession and a mechanical art; but there is one broad distinction, in practice at least, between the two, which I think no one can fail to recognize, and which I wish to emphasize. It is that in all mechanical arts, and, I fear, in some that are ranked as liberal, knowledge, so far from being disseminated, is, wherever practicable, carefully concealed. So that you shall hardly find a manufactory of wares, or of fabrics of whatever nature, which has not its carefully-guarded secret, either in the composition of the material with which it has to do or in the mode of its manufacture. To this end very often, as much as from other economical motives, labor is subdivided, each man knowing perfectly his little detail in the sum of the great result, but all further information being guarded from him. Thousands of workmen spend their lives in the manipulation of materials whose true composition is a secret carefully guarded by the heads of the establishments which employ them,—the chief item in the sum total of their capital, inasmuch as it has been the chief agent in making its accumulation possible. This is essentially the spirit of trade, greedy to get and eager to keep,—a grasping spirit and a selfish one. I do not quarrel with it; I simply characterize it.

The science of medicine has seen the day, and that a not very remote one, when it too was not free from this reproach; she has had her Cagliostros and her Chamberlens, arch-quacks and arch-shopkeepers, whose names have come down to us branded with infamy or burdened with contempt. But whatever may be the defects and shortcomings of science to-day, not only in the department of medicine but in the whole domain of thought, she has not the sin of sordid greed to answer for. In every land her devotees are living the thought which Agassiz uttered: "They have not time to make money." And so I think that we may with justice draw this sharp distinction between Science and Barter,—that while the latter withholds her stores, waiting for her price, Science stands with out-stretched hands inviting all men to come and share her gifts; she withholds no good thing from them. And so we find medicine, in this far higher sense than that implied merely by breadth of culture, pre-eminently a *liberal* profession. Her colleges stand with open doors; no man who is willing to work and eager to learn is rejected. Her periodicals teem with the records of the ripe experience of her most learned followers. So far from concealing discovery, there is rather danger from a too great eagerness to impart it before it is matured. Her hospitals stand open as refuge places for suffering human kind, of every race and condition. And, towering far above these more public benefactions, stands, as an imperishable monument to her honor, the vast aggregate of private, unostentatious, and, by men, unrecognized beneficence to which every day and every hour is adding fresh trophies. With such a record, well may she be careful of her fame, well may she shut her doors against that ungenerous man who, having received her bounteous gifts, having learned from her lips all the lore of the past and the higher knowledge of the present, crawls back to her doors with some puny thought, the outgrowth of that which she so freely gave, and without which giving it could have had no being, seeking to win from it some petty gain in vulgar barter, when, if it were a thousand-fold more important and significant, he should not only freely but rejoicingly lay it as a trophy at the feet of his mother and his brethren.

It is frequently urged as an argument against the justice of this prohibitory provision of the Code of Ethics, that copyrights on medical and surgical text-books are of the same nature as patent-rights on medical and surgical instruments and appliances,—that they are alike monopolies and alike a direct tax upon the medical profession, and that the one being condemned the other should not be sanctioned. But a moment's consideration must, I think, satisfy us that there is no real analogy between the two cases. The distinction is very clearly defined by John Paxton Newman in his treatise on the "Law of Patents." He says, "In the case of the monopoly of an invention, it is the idea and principle of the invention that is appropriated, and not the mere formal expression of it, as in the case of a copyright."

Copyrights upon medical works, so far from being intended to monopolize scientific truth, are designed solely to advance its dissemination; so far from placing restrictions upon the use of the truths they may contain, their only reason for being is that those truths may be made known. Indeed they, for the most part, merely arrange in convenient and permanent form truths already firmly established and generally known; or if they contain the results of more recent research, then those results have already been widely disseminated through all the numerous avenues of intercommunication known to the profession. What the copyright does secure to the author is not a monopoly of scientific truth, or even, directly, a reward for scientific research, but a just compensation for the time and labor involved in its formalization, and a measure of security for the large pecuniary risks involved in its publication. But it may be urged that if the physician-author is entitled to remuneration for the labor expended upon composition, then the physician-inventor is entitled to compensation for the labor, unquestionably often very considerable, involved in the preparation of his designs and models. But here again analysis demonstrates as wide a distinction between the character and value of the service rendered by the inventor and author respectively—apart from the ideas which, in the language of Newman, just quoted, "the one appropriates and the other gives formal expression to"—as there is in the nature of the protection which they may ultimately secure upon the result of their respective labors. We will assume it as granted that neither inventor nor author is, as a physician, entitled to remuneration for the discovery or amplification of a scientific truth in the domain of medicine or surgery. I as freely grant, and will assume, that both are entitled to just remuneration for the necessary time and labor expended in any other direction. Each is entitled to the full market value of the *kind of labor* which he individually expends. The conception of an idea in mechanics is usually that part of "invention" which is attended with the least direct expenditure of time; it is the tangible manifestation of that abstract thought, in concrete form, which is necessary to give it force, significance, reality,—to make it a *thing*, and not an idea, which costs; and it is just here that abstract science ceases and skilled handicraft begins. If the physician chooses to become a craftsman in the interests of his invention, and demands pay for his work, let him be paid for it. But as a craftsman he is entitled to the market price of the kind of labor he furnishes,—and no more. This account justly rendered, is hardly likely to be a large one, and, if the invention in question possess real merit, is sure to be more than balanced by the increased repute which would attach to the inventor, not only among his professional brethren but with the community at large. But, failing this, I cannot imagine for a moment that the inventor presenting a claim of this kind would have the slightest difficulty in obtaining a just remuneration from his professional brethren, individually or in association.

So much, then, for the nature and value of the service rendered by the professional inventor as a mechanician,—a service which a skilled mechanic could perform as well as, or far better than, himself, and for which he should receive only the compensation which that mechanic could properly demand. But with the service rendered by the professional writer, as an author, the case is far different; here not only is the labor of a higher character, but it cannot be vicariously performed. While much of the preliminary drudgery—the copying of manuscripts, the consulting of authorities, and the like—may be accomplished through the aid of others, the actual labor of composition must be performed by the author himself; his work must go forth to the world stamped with individuality, the direct outcome of his own genius, skill, learning and culture, or it is in no sense his,—a sorry piece of book-making, and not the fair blossom and ripened fruit of his intellectual growth. This *he must do*, no matter at how great a sacrifice of personal ease, or of time crowded to its utmost limits with other important duties or remunerative professional engagements. The value of such service so rendered cannot be overestimated, nor can the reward due therefor be measured by ordinary standards, or subjected to ordinary commercial limitations. A great scientific work is a boon for which no price should be grudged.

I have thus far viewed this question solely in its relations to the domain of general medical science, because the same principles which apply to medicine and surgery in their wider sphere of operations are equally applicable to our special branch of the healing art. The whole includes its parts. This may in a sense be viewed as a test, a pivotal question, for the dental profession. By the record we have made and are making upon this point, as well as by scientific accuracy and breadth of culture, will our claims to true professional liberality be measured. In reviewing the history of the past quarter of a century, I think that we can well congratulate ourselves upon the progress which has been made in rescuing dentistry from the grasp of ignorance and empiricism, and establishing its teachings and practice upon the broad and enduring foundation of scientific truth. We can congratulate ourselves upon the fact that it has ceased to be a mere handicraft with its carefully-concealed process; that to-day the knowledge which it possesses is fully imparted to all who have the desire to learn, not only through the individual contributions of its practitioners, but through the organized efforts of well-skilled teachers, operating through the agency of established, respected, and prosperous institutions of learning.

Dentistry not only has her incorporated schools, but she has a literature every year increasing in volume, growing in interest, and enhancing in importance. And all these agencies to promote her advancement have been followed by their legitimate consequences in practical results. We are to-day working by far more scientific methods and achieving far more enduring results than was possible within the memory of many who now hear me.

Thus standing as a recognized branch of the healing art, doing an important and necessary work, and doing it thoroughly well, largely promoting by our efforts the health, happiness, and longevity of the human race, we have reason to be proud of our vocation, reason to guard its good name among the arts by a repudiation of every act antagonistic to that spirit of broad liberality upon which our profession must chiefly rest its claim for consideration and respect in the judgment of mankind.

I do not join in the cry that the dental profession needs "elevating." That too many of its followers need elevation in every possible moral and intellectual application of the term is an unfortunate truth, as of what profession is it not true? But that our profession needs elevation in the sense that its field of duty is meager, unimportant, and unworthy is a suggestion which I utterly contemn. It is a suggestion born in the brain of a snob and worthy of its birth-place. That the worthy practice of the dental profession demands a generous culture, a sterling integrity, and a broad humanity, a mind, a conscience, and a soul, no man familiar with its duties and requirements can for a moment question; least of all can we question it who know so well of how much and irreparable mischief the utter absence of these qualities upon the part of many has been and is the cause. No, the aim and purpose of the true friends of dental education to-day is not to elevate the dental profession in any social sense, for by virtue of its functions and its attainments it takes its place, a peer among the arts beneficent,—arts whose aim is to relieve human suffering and promote the welfare of the human family. What is needed and sought for, is not an elevation of our profession in the interests of an ignoble vanity, but a broadening of its usefulness in the interests of a generous humanity. The task which to-day confronts educated dentistry is that of spanning the gulf which exists between our special knowledge in dental pathology and therapeutics, and the special ignorance upon those subjects which is too lamentably characteristic of the medical profession at large. When this hiatus is once supplied, when physician and dentist become more generally reciprocally helpful, the special skill of the one supplementing the general knowledge of the other, then there will be clearer and more accurate diagnosis, and, as a result, more thoroughly scientific treatment, in that large and increasing class of cases in which lesions of the dental structure or associated parts are intimately connected with, or directly the cause of, diseased conditions in the system at large. There can be no satisfactory consultation without mutual respect; there can be no mutual respect, from the scientific stand-point, without equality of attainment.

Whoso labors for science need have no fear that his reward for service done will be lacking, for science is just, as men are just, in the long run. False pretense and vulgar sham, however they may deceive for the moment, can by no means stand the stern and searching analysis of Time. For what we really are we shall be justly valued, and paid for what we really do.

(To be continued.)

VERMONT STATE DENTAL SOCIETY.

The second annual meeting of the Vermont State Dental Society was held at the St. Johnsbury House, St. Johnsbury, Vt., Wednesday and Thursday, March 20th and 21st, 1878.

The following-named gentlemen were elected officers of the society for the ensuing year:

President.—Dr. J. L. Perkins, St. Johnsbury.

First Vice-President.—Dr. H. A. Baker, Woodstock.

Second Vice-President.—Dr. S. D. Hodge, Burlington.

Third Vice-President.—Dr. W. H. Kingsley, Middlebury.

Secretary.—Dr. C. D. Newell, St. Johnsbury.

Treasurer.—Dr. L. T. Lawton, Rutland.

Executive Committee.—Dr. Jas. Lewis, Burlington; Dr. S. L. Wellington, Northfield; Dr. E. E. McGovern, Vergennes.

C. D. Newell, *Secretary.*

MICHIGAN DENTAL ASSOCIATION.

The twenty-third annual session of the Michigan Dental Association convened at Ann Arbor on the 26th of March and held a three-days' session. The following-named gentlemen were elected for the coming year:

President.—Dr. George L. Field, Detroit, Mich.

Vice-President.—Dr. George H. Mosher, Jackson, Mich.

Secretary.—Dr. E. C. Moore, Detroit, Mich.

Treasurer.—Dr. J. Lathrop, Detroit, Mich.

Censor.—Dr. D. C. Hawxhurst, Battle Creek, Mich.

Consulting Committee.—Dr. D. C. Hawxhurst, Battle Creek, Mich.

E. C. Moore, *Secretary.*

AMERICAN DENTAL ASSOCIATION.

The eighteenth annual session of the American Dental Association will be held at Niagara, Tuesday, August 6th, 1878, and continue in session four days.

AMERICAN DENTAL CONVENTION.

The twenty-third annual meeting of the American Dental Convention will be held at Niagara, commencing Tuesday, August 6th, 1878.

CALIFORNIA STATE DENTAL ASSOCIATION.

The ninth annual session of the California State Dental Association will be held in San Francisco, June 4th, and continue four days.

William B. Kingsbury, *President.*

MASSACHUSETTS DENTAL SOCIETY.

The thirteenth semi-annual meeting of the Massachusetts Dental Society will be held in the parlors of the Bay State House, Worcester, on Thursday and Friday, June 6th and 7th, 1878; session to commence at eleven A.M. on Thursday. J. H. Batchelder, *Chairman Ex. Com.*

CONNECTICUT VALLEY DENTAL SOCIETY.

The fourteenth semi-annual meeting of the Connecticut Valley Dental Society will be held at the Round Hill House, Northampton, Massachusetts, on Thursday and Friday, June 13th and 14th, 1878, commencing on Thursday, at half-past ten o'clock A.M. C. T. Stockwell, *Sec'y.*

OREGON STATE DENTAL SOCIETY.

The annual meeting of the Oregon State Dental Society will be held in Portland, Oregon, on Wednesday, June 19th, 1878, at eleven o'clock A.M.; session to continue three days. S. J. Barber, *Secretary.*

INDIANA STATE DENTAL ASSOCIATION.

The twentieth annual session of the Indiana State Dental Association will meet at Indianapolis, at the Bates House, June 25th, 26th, and 27th, 1878. Distinguished gentlemen from other States will be with us, and an interesting meeting is expected. J. A. Turner, *Secretary.*

TENNESSEE DENTAL ASSOCIATION.

The annual session of the Tennessee Dental Association will be held in Nashville, June 26th, 1878. H. E. Beach, *Secretary.*

WISCONSIN STATE DENTAL SOCIETY.

The seventh annual meeting of the Wisconsin State Dental Society will be held in Madison, July 9th, 1878, commencing at ten o'clock A.M. M. T. Moore, *Secretary.*

NEW JERSEY STATE DENTAL SOCIETY.

The eighth annual session of the New Jersey State Dental Society will convene at Long Branch (United States Hotel), on Wednesday, July 17th, and continue in session three days. Dr. Wm. H. Atkinson, of New York, will address the society. Representatives from kindred organizations will be cordially welcomed. Parties desirous of exhibiting new appliances, dental materials, etc., will be given the opportunity. Hotel rates have been reduced to $2.50 per day.

The Board of Examiners will meet one day in advance (the 16th) at ten o'clock A.M., for the examination of candidates.

CHAS. A. MEEKER, *Secretary*, Newark.

PENNSYLVANIA STATE DENTAL SOCIETY.

THIS society will convene at Bedford Springs, July 30th. We have the promise of an excellent programme of essayists and operative clinics for this occasion, and have nearly completed the arrangements for at least one interesting surgical clinic. Several new inventions will also be exhibited. We should be glad to have still more responses to our notice in the April number of the DENTAL COSMOS.

G. W. KLUMP, *Chairman Ex. Com.*, Williamsport, Pa.

PENNSYLVANIA STATE DENTAL EXAMINING BOARD.

THE Pennsylvania State Dental Examining Board will hold its annual meeting for the examination of applicants at Bedford Springs during the session of the State Dental Society, which convenes Wednesday, July 30th, 1878. C. N. PEIRCE, *Chairman.*

ALUMNI ASSOCIATION, MARYLAND DENTAL COLLEGE.

THOSE desiring to communicate with the above association will please address Dr. C. D. Hayward, President, 173 Sixth Avenue, New York, or the undersigned. H. M. SCHOOLEY, *Secretary*,

1113 Pennsylvania Avenue, Washington, D.C.

PERISCOPE.

THE SYSTEMATIC COLLECTION OF FACTS.—Science, in its broadest and most practical sense, claims the service of *facts*. Their accurate observation and faithful record are fundamental conditions of success in research, and they form the data of every rational computation. It is impossible to overestimate the importance of thorough honesty in the collection, and precision in the description, of materials so essential to the progress of knowledge. It is generally easy to see what we look for, whether in the field of a microscope or the wider sphere of facts and circumstances that comprise the experience of life. No difficulty—on the contrary, an unconscious and almost irresistible tendency—exists to view them in a light favorable to our preconceived notions or theories. We color the aspect of affairs with the hues most consonant with our own conceptions. No intentional deception is practiced; fancy, unwittingly influenced by hope and prejudice, guides the pencil, and the mental picture produced as nearly approaches the ideal conception as the facts will allow. In its personal consequences this falsification is injurious; it debilitates the judgment by placing it in subjection to the caprice of fancy, itself the creature of conceit. Of far greater moment, however, is the mischief wrought on the stock of knowledge from which the workers in science draw the materials of their industry. Errors of observation seldom admit of correction, and, when once a real or supposed fact is placed on the register, it is beyond the reach of remedy. Faults, vicious coloring, and distortions incorporated during the process of observation and description are perpetuated, and will not afterwards be detected except some obvious incongruity should discredit the record.

These and other considerations which the remarks already offered will suggest can scarcely fail to show how prominent a part the narration of facts, clinical and experimental, must play in the progress of medicine. It is not too much to say that the business of accumulating facts is at once the most important and extensive branch of medical enterprise, and it must always devolve upon the general body of the profession; hence the need that, whatever else may be neglected, the faculty of close and accurate observance and expert narration should form an integral part of medical education. The power of intelligent perception is not so much a gift as an aptitude or function to be acquired by tact and perseverance. Observation in its true medical sense comprehends more than the mere cognition of appearances; it includes the noting of associated conditions—the surrounding and dependent circumstances of fact—and the relations of cause and effect, so far as these may be discoverable from the sequence of occurrences. Such analysis and synthesis as the efficient performance of this task implies are clearly beyond the capacity of an untrained mind. Observation of this extensive and composite character presupposes an acquaintance with something more than the first principles of science. Experience may eke out the defects of original study, but if the lessons of early, and many busy, years of professional life are not to be wasted, if the young practitioner is to become at once a laborer in the field of science and a useful contributor to the common store of information, this serious and difficult business of observing and recording facts must be studied as a branch of work, while habits of industry may be formed, and energy directed into useful channels.

The great business of collecting and collating facts cannot, however, be left entirely to individual enterprise. The skill and pains bestowed by the multitude of observers must be combined and concentrated. This is in part accomplished by the agency of societies, which might be incomparably more effective and render better service if, instead of acting as mere centers for the deposit of contributed information, they were to undertake the complementary task of digesting the material accumulated,—in a word, if presidents were selected with a capacity for, and were required to perform the duty of "summing up," and the discussions arising on papers read and cases reported were directed to the elucidation of points of scientific interest rather than the glorification of men and methods of treatment. Much, however, remains to be achieved before the net gain to medical science arising out of the total sum of work done by the profession will be commensurate with the labor expended. Great advantage would accrue by the adoption of common formulæ in reporting cases, the measure being taken by some approved standard. It is true that no two manifestations of the same disease are exactly alike; but points of difference, which, in fact, constitute the features of special interest, are lost or improperly recognized when no pains are taken to mark the significance of such divergences from the habitual course of disease as make up the distinctive character of the case. Little, if anything, is gained by the mere aggregation of similar occurrences; it is by the segregation of forms, and their association with conditions or temperaments, by which the individual manifestation is determined, that a profound and intimate knowledge of disease and practical medicine must be gained. The individualizing of special forms would obviously be facilitated by the adoption of common formulæ. We think the whole subject of clinical reporting is ripe for the consideration of a commission which might be appointed by the scientific societies generally. Good would certainly result from a well-considered expression of opinion as to methods of narration, and now that the old nosologies are all laid aside, it would be convenient if select cases were pointed out as standards, with which the instances of morbid action observed could be compared in description. Nothing of permanent value has been done in this department for many years past, and much would be gained by a serious and combined effort to supply the deficiency.—*Editorial in Lancet.*

HINTS AND QUERIES.

"He that questioneth much shall learn much."—Bacon.

Correspondents desiring a reply in this department are requested to make use of *distinctive signatures or initials*, and avoid the practice of signing their communications Reader, Subscriber, etc.

Correspondents who wish notice to be taken of their communications should authenticate them with their names. We cannot insert queries or replies except they are so accompanied. Names not necessarily for publication.

Will some one please inform me how to keep the moisture out of a cavity situated on the labial surface of a superior central incisor? The cavity extends far above the margin of the gums, and I cannot force the dam up high enough to answer the purpose.—A. R. Reed.

In the report of the proceedings of the First District Dental Society, published in the Dental Cosmos for April, Dr. J. S. Latimer referred to a case in which he restored a face to an incisor which had been broken, using a portion of a porcelain tooth. Will the doctor please tell us in detail how the work was accomplished, how he drilled the holes in the artificial tooth for the reception of the screws, and if he considers the repair a *permanent* thing?—C. H. D.

Answer to W. M., in May Dental Cosmos.—It cannot be accurately determined who first used the mallet in filling teeth. In Leonard Koecker's "Principles of Dental Surgery," published in 1826, in London, are these words: "But what is more surprising and repugnant, after the tooth is prepared for the reception of the stopping some operators actually employ a *hammer and punch to drive the metal into the cavity of the tooth.*" Also in Fitch's "System of Dental Surgery," published in Philadelphia, in 1835, this: "I will here mention a very objectionable mode of preparing the cavity, . . . and a most injurious manner of introducing or compacting the metal. It is by the use of a common drill, *turned with a bow and string*, to prepare the cavity, . . . and then to introduce the metal and further compact it by using a *hammer and punch.*"

James Truman has written that the mallet was used about the year 1835, by

Dr. Warren Leslie, of Waterloo, New York; also that "great credit is due William H. Atkinson, of New York, for his efforts to prove the value of the instrument."—A. H.

Reply to J. L., concerning Riggs's Disease.—By the term "Riggs's disease" is understood loosening of the teeth.

By the term "Riggs's operation" is understood a process of scraping, by which the roots of loosening teeth are freed from extraneous particles.

When roots of teeth are found beflecked with foreign concretions, such concretions are to be removed. The more thoroughly the operation is performed the better for the tooth or teeth implicated. Dr. Riggs's manner of manipulation implies thoroughness; the instrument employed by him allows of thoroughness.

When teeth are found to be loosening because of a process of chronic atrophy, associated exclusively with the alveolar structure,—a condition easily recognized by examining, by means of a probe or excavator, the inferred seat of trouble, and in noting absence of changes in the substance of the teeth themselves as well as in the surrounding soft parts, the operation practiced by Dr. Riggs, modified so as to scrape away the surface of the alveoli circumferences, commends itself as a promising treatment, inasmuch as some such influence is exerted as when the surgeon drills and wires the seat of an ununited fracture with a view of aborting a destructive, while at the same time arousing a reparative action.

Among the common causes of loosening of the teeth is solidification of the dentinal structure. In these cases the organs are found resistive of decay. Translucency has given way to a heavy yet perfectly clean opacity. Gums are seen to be in process of recession. Tooth-roots are commonly free of tartar. The exposed peridental tissue is shriveled and without vascularity. Chronicity is the expression of the whole process.

Solidification implies diminution in vitality. Diminution in vitality implies approach to the condition of a foreign body. Wholly solidified teeth are foreign bodies. The loosening of solidified teeth is an expression of effort made by nature to relieve herself of an incubus. For such loosening teeth there is no cure. Operative interference is markedly counter-indicated. The more scraping the sooner the loss. Riggs's operation, or any modification of any such operation, is entirely inadmissible.

Teeth loosen as a result of certain systemic vices. Epithelioma is found occasionally associated with the sockets of the dental organs. To scrape the roots of teeth so loosening would be to add fuel to a flame already fatally dangerous. Epithelioma is recognized by its giant granulations.

Mercurialization and iodization as causes of loosening are not at all uncommon. Diagnosis lies in the history of the cases. Treatment is systemic.

Purpura is an occasional cause. The association of this expression when found in relation with gum-structure lies with scorbutus. The condition of scorbutus is expressive of super-alkalinity of the blood. Indications are met by a free use, locally and systemically, of the vegetable acids and anti-scorbutic diet.

Teeth loosen when denied antagonism. The cure of such condition lies in the use of artificial articulators. All scraping and cutting is ill-directed.

Teeth loosen because of chronic inflammation existing in associate parts, engendered by the wearing of non-conducting dental plates; of such plates those made of vulcanite are most objectionable. Treatment: Replace with other material and treat the local congestion with washes of a stimulant and astringent nature. Scraping is unnecessary, it would prove injurious.

To sum up in a word the principles inquired after by the Dental Cosmos's correspondent, it is to be understood and recognized that treatment differs with cause. In the few illustrations suggested lies the lesson for every variety of case. Effect arises out of cause. Every cause carries with it the indications for its treatment. Scraping and cleaning roots to save teeth is well or ill, according to character of indication.—A. B. C.

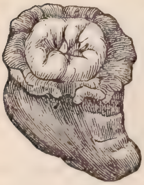
J. B. W., in the Dental Cosmos for February, says he has been cautioned against the extracting of teeth for pregnant women, for fear of the shock causing miscarriage. I have, in a practice of over thirty years, extracted teeth for women in all stages of pregnancy, and have never had any trouble to result.—H. C. H.

Replanted Teeth.—Do teeth once extracted and then restored have a special tendency to subsequent inflammation? This question is suggested by a little personal experience, and by the observations of Dr. Waters.

In an article by W. H. Rolling, in the *Boston Medical and Surgical Journal* for March 28th, the writer refers to a tooth which was extracted, filled, and replaced, which remained useful for five years and eleven days, when, without direct cause, it suddenly took on inflammation and had to be removed. Says the writer, "This suddenly-appearing pain and lameness occurs in a great majority of those teeth which after being replaced become firmly united with the body." This statement the author attempts to corroborate by stating that Dr. Waters has had quite a number of such cases, and every one of them behaved in a similar way.

For my own part, I had a left lower bicuspid forced out by the root of the molar next to it when it was being extracted. The dentist replaced the tooth, and after a few months it ceased to be tender and was firm and useful. Five and a half years later, without known cause, it began to ache and was tender. Nothing seemed to have any effect to relieve it, and, after three days' torment, I submitted to its removal. I did not suppose that this accession of inflammation in my case had anything to do with its previous removal. I was disposed to regard it as a mere coincidence. Cannot facts enough be gathered through the Dental Cosmos to prove or disprove the principles these cases suggest? Will gentlemen please communicate?—E. Chenery, M.D.

A Peridental Tumor.—The accompanying wood-cut represents a right inferior wisdom-tooth, or third molar, with tumor surrounding, sent me some days since by Dr. A. B. Eastman, dentist, of Wellsboro, Pa.



It is from the mouth of a lady patient about twenty-five years of age. The presence of this abnormal growth was recognized something over a year previous to its removal. The latter part of that time its increasing size became a source of annoyance, not so much from any obstruction it offered in mastication as from its being the cause and center of an irritation extending into the fauces, inducing a very decided sensation of choking. The tooth, as will be observed from the cut, was surrounded by this abnormal development—the roots as well as crown—entirely cutting off all connection with the arterial and nervous supply, except through the thickened walls of the tumor.

Histologically this growth was not very widely differentiated. Its upper part or that which surrounded and almost buried the crown of the tooth and presented a somewhat granular appearance was composed largely of a proliferation of impacted epithelial cells so dense that quite an effort was required to separate them sufficiently for an accurate examination.

The lower part of the tumor, or that which was entirely within the walls of the alveolar process, was still more dense, forming a structure in appearance hard and leathery; like the upper part it was composed of epithelial cells, with a tendency to a linear arrangement containing various amorphous patches of the salts of lime, showing quite an effort at calcification,—a condition occasionally presenting itself in the peridental membrane without causing much deviation from normal appearance or function.

The origin of this tumor was undoubtedly from the peridental membrane. In the absence of any testimony from the patient, I should feel quite safe in saying that in its incipient stages periodontitis must have been present. Judging from the appearance of the tooth I should say the pulp had been dead for some time previous to its extraction, but there is no evidence that devitalization of the pulp was the exciting cause of the tumor. Its benign character, its attachment to the roots of the tooth, its ready removal from the cavity in the jaw without cutting or laceration, and the readiness and speed with which the mucous surface, and the alveolar process and its contiguous tissues all returned to a normal condition upon its removal, tend to the supposition that it had but a local origin or significance.

To those who in the future favor us with pathological specimens of this nature, we should be obliged if they would preserve them either in glycerine, solution of hydrate of chloral, one-half ounce to the pint of water, or even in salt and water in preference to alcohol, as the latter substance contracts and hardens the tissue to such an extent that it is much more difficult to examine satisfactorily its structure.—C. N. PEIRCE.

AMALGAM AND THE LATE PROF. E. TOWNSEND.—A pamphlet has just been placed in my hand entitled "Plastic Filling and the Basal Principles of the New Departure," by J. Foster Flagg, D.D.S., read before the New York Odontological Society, at a special meeting, November 20th and 21st, 1877. The author discusses the merits of amalgam as a material for filling teeth, and uses the name of Dr. Townsend as authority in such a manner that it seems only a duty I owe to his memory to place him right before the younger members of a profession which he honored and adorned. The part which Dr. Townsend is made to play in this controversy is ungenerous and unjust, if I understand what his position really was. It is true he entered on the field of experiment in an honest endeavor to arrive at a satisfactory conclusion regarding a subject which engaged the attention of many of his best friends,—some on either side. It is not worth while to canvass his utterances made from time to time during his experiments with it: the conclusions at which he finally arrived are what concern us.

I think it not out of place to present two letters received from Dr. Townsend, in which he refers to his experiences with amalgam, and gives his conclusions.

The first letter is in response to one I wrote him, accompanied by a number of specimens of fillings which had failed in the mouths of his own patients, and which I collected and sent to him that he might see the result of his operations in the cases of patients who did not return to him.

A formal recantation, and the announcement of his determination never to use amalgam again, will be found in the *Dental News Letter* of April, 1858, vol. xi., Number 3, page 169. J. D. WHITE.

"March 2d, 1858.

"My dear Sir,—I sent back the amalgam fillings to you without comment, as I was then too feeble from an attack of influenza to write.

"I will now say to you that I am very sorry I ever was induced to advocate it, as I see it has been grossly misused, and it has also failed *me* in the very cases where I most relied upon it. I have thrown it aside entirely, emptied my bottles, and *will never* use it again in *any* case. My brother Charles, my brother Edward, and my brother-in-law, Mr. Kirk, have also pledged themselves to me never to employ it.

"I shall appear in the next number of the *News Letter*, when I hope to make my recantation clear to all men. I very much regret it, and shall not be ashamed to own up.

"In one thing in the past year my conscience is clear to my patients and to the profession. I have taken unusual time, pains, and care with my gold fillings, and not having been so crowded as to be uncomfortable, I think I may say have put in more perfect 'stoppings' than ever I did. This little brag I hope you will think pardonable as an offset to some of my BLACK deeds, and besides, *you* know I can fill teeth.

"Very respectfully yours,

"E. Townsend.

"Dr. J. D. White."

"Monday.

"Dear Doctor,—I have received your kind note, and thank you for the credit you do my honesty of purpose. On Saturday, during the pauses of my suffering from disease, I wrote what I now send you for the *News Letter*. I hope it is not *too late*, and also that it will meet your views. Will you do me the favor to send it to McCurdy, and not let it fail to appear?

"I am suffering from great debility. I have had a bad catarrh, and though that has disappeared, it has left great difficulty of breathing and general debility, with loss of appetite.

"As soon as I find a sailing-vessel bound for Havana, the doctor wishes me to go there and remain until May.

"Very respectfully yours,

"E. Townsend.

"Dr. J. D. White."

As many of the readers of the Dental Cosmos may not have access to the *News Letter*, we copy the recantation referred to by our correspondent.—Ed. Dental Cosmos.

"For the *Dental News Letter*.

"AMALGAM.

"Messrs. Editors,—I promised to report to you any change in my practice in the use of amalgam for filling teeth, founded upon further experience. In all that I have ever said or written upon amalgam I have been very careful not to advocate its use except in those cases which could not be filled with gold, and where extraction was the only alternative. I find my name has been used as authority for its indiscriminate and unlimited use, which I certainly never intended or supposed could happen.

"I wish now to say to the profession that I have entirely abandoned it, and shall never use it again in my practice. I have come to this resolution for reasons which I will now state. In many of the cases where I most relied upon it, and expected to have the best results, it has entirely failed; as in the buccal cavities in molars, when they extended beneath the free margin of the gum, I found that while in some mouths the material remained white and clean, in others it became very black in a few days, and in almost all cases, upon removing the filling, the under side was blackened, and the same color given to the tooth. Again, in the infirm teeth, for which it seemed the only thing, and for which it was best adapted by its plastic nature, many of them have had to be removed, owing to suppuration of the gums, caused by the tight closing of the previous vent for the escape of pus.

"Therefore I have come to this broad conclusion, that a tooth so infirm as to need a soft filling would be best removed, for the health of the mouth and the health of the patient; and that my practice hereafter will be to advise their removal, and then leave the responsibility with the patient.

"Elisha Townsend,

"No. 1606 Locust Street.'

THE

DENTAL COSMOS.

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ORIGINAL COMMUNICATIONS.

DENTAL PATHOLOGY AND THERAPEUTICS.

BY J. FOSTER FLAGG, D.D.S.,

FORMERLY PROFESSOR OF DENTAL PATHOLOGY AND THERAPEUTICS IN PHILADELPHIA DENTAL COLLEGE.

[Entered according to Act of Congress, in the year 1873, by J. Foster Flagg, D.D.S., in the office of the Librarian of Congress at Washington.]

(Continued from page 302.)

IX. *Excess of filling material.*—There is probably no one point which demands more marked attention upon the part of both novice and *proficient* than the *absolute* certainty of the non-existence of an excess of filling material.

By "excess" of filling material is meant an amount which produces an injurious result.

An exceeding large amount of *superfluous* material may not be *excessive* in this signification, while an almost *infinitesimal* amount may be *excessive* to a serious degree.

Neither is it, by any means, the amount of *truly excessive* filling material which governs the degree of consequent irritation; material in *great excess* is sometimes "tolerated" with but slight inconvenience; while an *almost inappreciable amount* is sometimes the excitant to a more or less constant infliction, and even continuously severe suffering.

This, of course, is dependent upon the temperamental attributes, together with the systemic condition (both mental and physical) of the individual.

I wish, however, to impress the fact, that the leaving of *no excess* of filling material is the *only* correct and entirely safe practice, and that the universal following of this rule is to be attained *only* by the most vigilant and untiring circumspection.

Even with much care upon the part of old, experienced, careful, and expert practitioners, this result is not *always* attained; how very guarded then should be the young, the inexperienced, and the comparatively inexpert beginner.

Excess of filling material is liable to occur in four directions: 1st, upon the articulating faces of teeth; 2d, upon the cervical or root portion of such cavities as impinge upon cementum, particularly when partially covered by gum-tissue; 3d, in excess of contour, mesially or distally; 4th, by protrusion of canal filling through apical foramina.

1st. *Upon the articulating faces of teeth.*—In this connection, *excess* of filling material refers only to such fillings as are desired to comport with a natural occlusion. It is sometimes, though rarely, advantageous that a change of occlusion should be made by so filling teeth as that the "bite" should be upon the filling. This is done to prevent continuance of undue wear of tooth-tissue; to lessen irritation in some other overtaxed tooth; to prevent or retard the tipping of a tooth, or the separation of teeth, and to restore to usefulness broken teeth.

In the absence of these conditions, fillings upon the articulating faces of teeth should always be so contoured as to produce *no interference* with a normal occlusion. The methods for diagnosing any such interference are three: the *sensation* of the patient, the *sight* of the practitioner, and the *sound* of the occluding teeth.

Although it is usually not difficult to so shape fillings as to make them comfortable, and to rely for the accomplishment of this solely upon the *sensation* of the patients, ye cases occur where this result becomes increasingly more difficult, until a perfectly satisfactory occlusion is only attained as a sequence to a great amount of careful manipulation, and by the combined efforts of a sensitive and accurate patient and a very competent and skillful dentist.

It is also true that the *excess* of material is markedly governed by the sensibility of the patient, and, as well, by the conditions of the tissues surrounding the filled tooth; quite a superabundance being *tolerated* by some patients, while not the slightest amount can be even *endured* by others; quite a superabundance being *tolerated* by a tooth devoid of sensibility, and surrounded by healthy tissue of low grade of response to irritation; while a microscopic film too much is unendurable to teeth of delicate sensibility, particularly when surrounded by tissue which has been but recently irritated, and even yet is in the hyper-sensitive condition of convalescence.

Passing by such cases as are easily recognized by the patient as "not right" and "too full," and, equally promptly, so shaped as to be "all right," I purpose directing attention first to such *doubtful* cases as elicit to the question, "Is it right and comfortable?" the reply, "I *think* it *seems* so."

Discomfort, soreness, and even an irritation, resulting, in time, in periodontitis, not infrequently arise from just that degree of *excess* of filling material which caused the patient, *while not recognizing it*, to use the words "think" and "seems."

Therefore, when any reply is made which admits of the *possibility* of a *doubtful* construction, I would advise a continuance of the removal of filling material until a *positive, unequivocal* announcement is made that it is *just right*, and *perfectly as it should be.*

As difficulties increase, such as awkwardness of occlusion, distance posteriorly of filling, impossibility of visual examination during closure, and existing *doubt* in the mind of the patient as to whether it is right or not, the statements of patients are to be less relied upon, and the other means of diagnosis more decidedly brought into requisition.

Visual examination almost always tells of excess of filling material, if any exists, even after the patient *thinks* it is as it should be.

A mark made by the occluding tooth, either as a dent, or rub, or spot, is discernible upon the face of the filling, which will indicate the point of excess.

This should be cut, burred, filed, or stoned out, until none such appear; but in order to insure complete success many occlusions should be taken, and it should be observed that the "bite" is given in all possible ways.

Even with this care, it will sometimes be found, after several days, that a *mark* upon the filling will show still-existing excess of material.

It is desirable that these *marks* should be obtained in different ways for different kinds of fillings: Thus, for gold or tin fillings, the face of the plug should be stoned or pumiced, in order that a *bright* or *burnished spot* be made by biting upon it, and the bite should be made *with force*, so as to do this.

For gutta-percha fillings, the face should be smoothed, when comparatively little force will make an indentation. Surplus material can be removed by a warm instrument or by engine burs.

For amalgam fillings much more care is required that a *gentle occlusion* should be made, even though walls of tooth completely surround the filling, for it is desirable that the process of "setting" or "hardening" should not be interfered with by pressure, while, if the filling forms a large portion of the crown of the tooth, with, possibly, tooth-walls upon only a part of its periphery (a frequent occurrence) any undue force would be liable to "check" the plug, and might even break it out.

To secure an invariable gentle occlusion upon these fillings, it is well to touch the bucco-articulating edge of the *lower teeth* with the finger, and thus control them in a measure as the directions are given to "close the teeth *gently*."

The face of an amalgam filling should be whitened by wiping it with a cotton pellet, or by passing over it an appropriately-shaped stick of soft pine, that thus the point of excess may, by occlusion, be *marked* as in other metal fillings.

In fillings of the "zinc plastics" it is sometimes the most difficult of all to decide the location of "excess." Some of them harden with such rapidity and density that but a slight *mark* can be made, and this is so nearly like its surroundings, both in color and texture, that it is difficult of discernment.

For these, then, I rely *in part* upon the sensations of the patients, and I would here mention that the "feel" of occlusion being given to patients through the medium of the jaw-tissues (for natural teeth by their roots, and for artificial teeth by the resting of the plate upon the gums), it is curious to note how this *reverses* sensation, and thus makes "excess" upon the mesial part of a filling *appear to the patient* as though it were upon the distal, and excess upon the lingual or palatal edge seem to be upon the buccal edge; thus, if a patient locates the "touch" upon a definite part of the filling, it will *usually* be safe to remove a portion of the opposite extremity of the face of the plug.

In all cases of excess of filling material there will be given an abnormal *sound* upon occlusion.

The usual *natural sound* of occlusion is a *sharp, clear click*,—a sound which should be *learned* from hearing it in practice, and when one has become familiar with it, any deviation is easily recognized.

Of course the *difference* in sound given by various filling materials has each its own peculiarity, but with all, in varied degrees, there is a dull *thud*, which is in marked contrast with the *clean sharpness* of a *clear occlusion.*

Sometimes the excess is so very slight that, with all the tests for its presence, it remains undiscovered, and yet there is a suspicion upon the part of both patient and practitioner that it does exist.

For the determination of this it is necessary that *time* shall be given, when it will be found that a day or two, or a week, will show either a dent, a mark, or an abrasion, with already an occasional annoyance, or perhaps even a little soreness.

The *slightest* mark should be removed, and with it a sufficient amount of filling material to justify the presumption of future exemption from this cause of irritation.

2d. *Upon the cervical or root portion of such cavities as impinge upon cementum, particularly when partially covered by gum-tissue.*

In these cases the work of insuring the non-existence of *excess* almost entirely depends upon the dentist.

Occasionally, when the edges of filling and cavity are not "flush," the patient will discover it in picking the teeth. This is particularly apt to be the case when the filling is sharply overhanging, and I have been surprised at the amount of material to which my attention has been directed, in cases where I had bestowed more than usual care that no such *excess* should be permitted to remain.

NOTE.—I regard it as appropriate, at this time, to recall attention to the first paragraph of the VIth cause for periodontitis, that I may point out the danger of *insufficiently filling* such cavities as are under discussion.

Although an insufficient amount of filling material would not be so liable to give rise to that degree of irritation which would result from an excess, it would, nevertheless, permit the modified continuance of any irritation dependent upon the cavity edge.

It should therefore be the aim of the operator that *these cavities*, perhaps beyond all others, should be *exactly* filled,—just full enough, and not in the least too full.

It will be found, in practice, that this is no easy task; it is not *easy*, even for the *expert;* how much more difficult, then, must it prove to the novice!

The inaccessible position of many of these cavities, between teeth; upon the distal faces of teeth, deep down under the gum; in and under the bifurcations of roots; upon the buccal faces of the roots of posterior teeth, between the closely-fitting cheeks and jaws (rendered more close by the opening of the mouth), makes the *exact* filling of them so difficult as *practically* to render it *impossible* that it should be *accomplished universally.*

A knowledge of this should, however, only tend to increase the vigilance which must be untiringly exercised in this direction; a vigilance that has to combat a degree of inaccessibility which, at times, even *precludes* the *perfection* of manipulation, a concomitant flow of blood and saliva which prevents the possibility of satisfactory vision, and a natural repugnance to the infliction of that degree of suffering which is almost inseparable from the *thorough* performance of these unwelcome tasks.

3d. *In excess of contour, mesially and distally.*—Irritation from this cause arises from the fact that separations, made by wedging, for the purpose of introducing fillings, are filled *too full*, and thus the teeth are maintained in a slightly abnormal position, even after they have closed together.

This slight abnormality of occlusion is, in some instances, incapable of so adjusting itself as to establish comfort, and thus, little by little, the discomfort increases until mastication upon these teeth is entirely prevented.

I have in quite a number of instances given perfect relief to patients by passing a thin separating file between teeth which had been largely filled in "contour," evidently with the design of *thus* preventing a recurrence of decay.

4th. *By protrusion of canal filling through apical foramina.*—It seems to have been definitely settled that, as a rule, it is better, in cases of pulp-extirpation, to fill the root-canals.

Without discussing this question, nor the propriety of the various proposed methods of doing this, I shall now only refer to the impropriety of allowing a canal filling to pass beyond the apical foramen.

I have specimens, not only of the passing through apical foramina of splinters from wooden and quill toothpicks, pieces of broom-corn splints, bristles from tooth-brushes, dental probes, and one small-sized pin, its head firmly fixed in the pulp-cavity, but also of the protrusion in various lengths, from a sixteenth of an inch to more than half an inch, of almost every kind of proposed canal filling,—wire, wood, gold foil, cotton, and gutta-percha.

I think many of these unfortunate occurrences have been due to the usual instructions in regard to the *opening through* these foramina, and the treatment of "pumping" medicaments from pulp-cavities out through fistulous openings.

Where large apical foramina already exist, and particularly when pulp complications occur in connection with teeth not fully formed, I can readily admit the easy possibility with which this is done, and such cases should be treated with the more caution in consequence of this condition of things; *but the practice of enlarging foramina for the purpose of doing this I wish to antagonize upon every occasion.*

I regard it as unsound in principle, and calculated to be prejudicial, rather than in any way beneficial to the interests of the tooth or its surrounding tissues.

When the roots of teeth are not fully formed, or when the apical foramina are drilled through, it is simply impossible to fill the canals justly, solidly, and evenly full; but when these foramina are of the usual diminutive, normal size, the *liability* of *passing* filling material through them is quite different in the employment of different materials.

Thus, *pointed* gold wire is probably the most dangerous canal filling in this respect. I have one specimen of this which protrudes a little more than a quarter of an inch.

Finely-pointed wooden splints, especially the hard woods (hickory, orange-wood, etc.) used for this purpose, are probably next in liability to protrude.

Gold foil tightly twisted is occasionally passed beyond the apex. The longest specimen of this occurrence in my possession (passing nearly a quarter of an inch) never gave any inconvenience; it quietly gave rise to an abscess, established a fistula, and the tooth (a left superior central) remained in service until it was removed, with other teeth and roots, for the purpose of introducing a piece of artificial work.

I have several specimens of cotton protrusion, one notable one of more than an inch in length.

The only protrusion of gutta-percha which I have ever seen is in the shape of a little globular excrescence, evidently caused by slightly excessive pressure upon the dissolved gutta-percha. In this case the foramen is large, and the result quite likely to occur.

(To be continued.)

ON A METHOD OF TREATING SENSITIVE DENTINE AND EXPOSED PULPS.

BY A. H. THOMPSON, D.D.S., TOPEKA, KANSAS.

The necessity for the classification of the two dental lesions of sensitive dentine and exposed pulps in the same pathological and therapeutical category, has not been sufficiently recognized by the members of our profession. The intimate physiological connection and relationship of the dentine with the pulp, taken together with the fact of the formative origin of the former from, and its nutritial support by, the latter, argues the necessity of this recognition; and if, while bearing this in mind, we take a step further into the pathology of the two tissues, we must be convinced that their connection and sympathy in disease is very close and intimate. We can believe, therefore, that any disease and inflammation of the dentine must excite the sympathy, at least, and perhaps the active participation also, of the pulp; and also that disease of the latter will affect the dentine so far as its nature will permit.

Caries is by far the most common and destructive disease to which the dentine of the teeth can be subject, and to the treatment of its painful results this paper especially refers. We hold that in the various degrees of its progress and of the manifestation of its effect upon the dentine, the pulp participates to the extent of a sympathetic irritation of corresponding extent to the progress of the lesion in the dentine; controlled, of course, always, by the various idiosyncrasies of the teeth and the patient. If we take a typical small cavity of decay in which we find more or less sensitiveness to the excavating instrument, and but little or none to ordinary irritants, there is, even though of small extent, a participating, sympathetic irritation of the pulp. In a somewhat larger cavity, where there is greater tenderness to the instrument and perceptible sensibility to some of the ordinary irritants,—such as air or saliva, thermal changes, condiments, etc.,—there is active participation of the pulp which a sensation of pain will often render apparent. In a cavity yet larger, in which the pulp is almost exposed, we usually find the dentine exquisitely painful to the instrumental touch and extremely sensible to ordinary irritants, and the pulp on the eve of odontalgia from the irritation of the dentine. Going further and taking a cavity in which the pulp is entirely exposed and aching, we find active pulpitis brought on by a gradually increasing, abnormally irritated condition of the dentine, until the disease creates actual exposure to the air and consequent pain. In a further condition of a suppurated pulp, the dentine has begun to die and the pulp is itself approaching death.

This sympathetic participation in disease is due, of course, to the connection of the two tissues through the contents of canaliculi or tubuli of the dentine. We have yet to conceive of and appreciate the fact, in our treatment of caries of the dentine, that this tissue is more nearly allied to bone than to enamel, and that we dare not presume upon its being a structureless epidermal substance, which we can cut and lacerate with the same impunity which we exhibit in cutting the digital nails or the hair of the body; yet this principle underlies our present methods of operating upon carious teeth. We cut and prepare a sensitive cavity, and fill with highly-conductive metals to within a millimetre of an already irritated pulp, and then wonder why that tooth should continually be sensitive to thermal changes, electrical contact, etc., or why the pulp should, perhaps, die, with or without much pain, and periostitis, abscess, and, possibly, necrosis follow. We do not appreciate the fact that we are dealing with irritated bone, in a condition similar to inflammation in vascular tissues, and that when so irritated we are trifling with a volcano, by filling upon it, and taking the risk of the smallest chance of escaping disaster.

The point we would especially urge is, that sensitive dentine and aching pulps are due to the same cause,—*i.e.*, exposure to the irritating effects of the air, saliva, thermal changes, the chemical effects of condiments, etc., the air being the chief irritant; and that the difference between the two lesions is one of degree but not of kind; there being, in fact, a graded connection between the various degrees of disease and pain from the moment of sensation in a minute cavity on through the various stages to a raging pulpalgia.

Simple reason would suggest the best treatment of this condition of pain to be its alleviation and the protection of the parts from the irritants which induce it, and it is upon this principle that the method submitted is based. The irritated and semi-inflamed cavity walls must receive palliative treatment, irritating agents be thereafter excluded from contact by the mechanical filling and closure of the cavity, and time be allowed for the recuperative efforts of nature for a restoration to normality.

The material used for this purpose is principally oxychloride of zinc, which, being a cement with certain antiphlogistic properties, used in connection with an intervening material to prevent cautery of the pulp or of the dentine near the pulp, is pre-eminently adapted to the purpose. The abuse of this very valuable substance has, however, brought it into disrepute with the mass of the profession; but undeservedly so, for with the continued success the writer has had in its use, it is scarcely claiming too much to say that it is one of the most valuable acquisitions that have been added to our resources for many years. Every material can be abused so as to be worse than useless, and while being conformed to harmonious application to use, is frequently so abused. Oxychloride of zinc is no exception to this rule; but it is now time that the period of its empirical abuse should be brought to a close. The harm done has been through experimental and mistaken methods in its employment, which could scarcely fail of doing injury. But these faulty methods, having been discovered by dearly-bought experience, should be abandoned. It is the object of this paper to describe methods of using oxychloride which have been almost universally successful, and which recommend themselves to general employment. These processes have been developed through several years' use of oxychloride, by suggestions from various sources, and by experiment, until the following methods, which are to be detailed, were perfected: these having now been used for some few years unaltered and with great success.

Beginning our descriptions with a small, simple cavity, which we find so exquisitely sensitive to the instrument as to almost or quite preclude operating (such as are usually found upon the buccal faces or cervices of molars and bicuspids), the method of treatment is, first, to remove so much of the carious *débris* as can be well done by using an excavator loosely, and then to saturate and cauterize the cavity with clove oil or carbolic acid, or both. After drying, the oxychloride should be used in a thick cream, pressed home well and solidly, dried with spunk, and covered with a drop or flow of sandarac or shellac varnish. This filling should remain for from three to four weeks before attempting to insert the metal filling, when the cavity can then be prepared and filled with ease and deliberation. If the patient is strong and in good health and the teeth are of good quality, three weeks will be sufficient; but if the patient is asthenic and nervous and the teeth of bad quality, a longer time will be required to secure results. On the removal of the oxychloride very little sensitiveness will be found, in most cases, and the operation can be completed with a certainty which most assuredly could not have obtained in the first condition. This beneficial result has been brought about, mainly, by the mere exclusion of the irritating contact of the air, to which, of course, other irritants contributed their effects. The caustic properties of the oxychloride have also aided, in the beginning of the treatment, the reduction of sensibility, and the exclusion of all irritants for a time has completed the treatment and enabled nature to restore normality.

Next, taking a typical cavity of small, ordinary size, in any position, the treatment will be about the same as the preceding, except that the carious *débris* in the bottom towards the pulp would best be left, which, after saturation with carbolic acid, will protect the canaliculi leading directly to the pulp, and obviate any unsafe irritation of this organ. In both this and the preceding type there will likely have been no sensibility to ordinary irritants, however much there may be to the excavator. But on going further and taking a larger, ordinary cavity, there will likely have been some sensibility to cold air and some condiments. It will be advisable to use in this cavity, even at so early a typical stage of encroachment upon the pulp, an intercepting and protecting material in its direction. This will consist of any ordinary and innocuous powder as a vehicle (whiting answers the purpose very well and absorbs the fluid readily), made into a paste with clove oil or carbolic acid, as the case may require. In this type, after removing as much of the carious *débris* as possible from a zone within the edges of the enamel, the bulk of the attached decay is allowed to remain in the bottom and saturated with carbolic acid. This decay is then well covered with clove-oil paste pressed lightly into place and dried with spunk. The oxychloride is then applied in a thick paste, pressed lightly but firmly into place and dried with spunk, and varnished. This will have to remain for from four to six weeks, as may be indicated by the idiosyncrasies of the patient and of the teeth.

In a cavity of still larger size in which there has been a greater or less amount of sensibility to external irritants and perhaps a little aching, we reach a type which requires extremely delicate handling, and the demand for delicacy increases as we proceed with still worse types. In this class of cases the direct application of the oxychloride must be carefully avoided, for the danger of causing death of the pulp from its cauterizing effects is very great, and the interposition of the oil paste becomes an important part of the process, the neglect of which will likely event in disaster. This result is the ordinary concomitant of such an unwarranted abuse of oxychloride, and which has brought this material into undeserved disrepute. In the case under consideration, after removing the loose *débris* and the attached carious matter from the marginal zone, the still attached decay in the bottom is let remain as the best possible protector of the thin lamina of dentine next to the pulp. The cavity is then saturated with oil of cloves, followed by just a touch of carbolic acid, clove-oil paste applied thickly to the decay and pressed lightly into place. The oxychloride is then applied in a stiff paste, packed against the periphery of the cavity, pressed lightly to render solid and dry, and varnished. By using the oxychloride stiff the caustic effects of the zinc chloride are reduced to a minimum, as there is no surplus fluid. The filling is also thereby rendered more dense and hard, and will wear better, as this must be left untouched for from six to eight weeks.

The next type is that of a simple exposure of the pulp of recent occurrence in which a little aching has occurred. After the removal of loose *débris* merely, clove oil should be applied under sandarac and cotton, or other stopping, for twenty-four hours. If the aching is obstinate, carbolic acid must be added to the application. The mixture of iodine and aconite should be applied to the gum-tissue over the root. If all has been quiet on the return of the patient, the following, or perhaps the second day, the carious matter should be removed, except over the pulp, and the cavity nearly filled with clove-oil paste, leaving merely a sufficient space within the margin of the cavity to retain the oxychloride. This should be mixed well into a stiff paste, applied, and packed carefully against the walls with instruments, pressed and dried delicately with spunk, and varnished, and an application made to the gum. This must be left for six or eight weeks.

The next type is that of complete exposure of the pulp which has been the cause of considerable suffering, but is comparatively recent. The exposure is not of long standing, and there is as yet only inflammation and some congestion, but no suppuration of the pulp. After removal of the *débris*, clove oil and carbolic acid are applied for twenty-four or forty-eight hours, and the application made to the gum. If it does not quiet, the treatment must be renewed, with, if the suffering is excessive, the addition of chloroform or morphia. But if all has been quiet on the return of the patient, the clove-oil paste should be applied to nearly fill the cavity, and merely covered with sandarac or other stopping for twenty-four or forty-eight hours longer. If still quiet, sufficient of the paste is then removed, and a narrow zone prepared within the margin of the cavity to receive the oxychloride, which is applied as in the previous case. This case must be left for eight or more weeks before inserting the metal filling.

The next type is that of an exposure of some weeks' or months' standing, in which pain has been rather intermittent. It may be that general comfort has been maintained by a sort of sufferance, or that occasional severe paroxysms of pain have supervened. Pain is manifested in various degrees and manners in this class of exposures, and the pulp is at different times in different conditions. It may be merely in a chronic condition of congestion, or it may be in a state of partial suppuration, or again, perhaps a fungous growth from the orifice of exposure may relieve the congestion. But in any event or condition in which an ordinary exposure of long standing may be presented, it offers at best an unfavorable prognosis; and yet, although the chances are against the probability of the conservation of life, we feel warranted in proceeding upon a hopeful method of treatment, even for the smallest chance. In many cases the idiosyncrasies of the patient will justify this risk, and in others, again, any attempt to preserve life will be contraindicated; each case must be "a law unto itself." In such as allow of the attempt, the first step in treatment is, after removing the *débris*, to saturate the cavity well with oily carbolic acid. This is severe, perhaps, but a pulp in an extremely congested, suppurating, or fungous condition will require heroic treatment. Life is nearly gone, and the treatment must be prompt and thorough. The medication is allowed to remain in contact with the pulp and cavity for twenty-four or forty-eight hours, and an application of the iodine and aconite mixture made to the gum. At the expiration of the specified time, if all has been quiet, or nearly so, the paste made with carbolic acid is applied carefully, and dried, and the cavity again stopped for a day or two. At that time, if all is yet quiet, the oxychloride is applied carefully in a stiff paste, and the case left for two months or more. If the odontalgia should be difficult to overcome, or should recur after the insertion of the temporary filling, the application must be renewed or varied by the addition of clove oil, chloroform, or morphia, or, as a last resort, arsenic.

We hold that a large enough percentage of pulps may be saved alive by this treatment to warrant the attempt in all cases where the indications are at all propitious, or will even promise a chance. And if it fails,—if aching should recur which cannot be quieted, except by devitalization, if the pulp should die and cause periostitis, or if the pulp be found dead upon removal of the temporary filling,—the one resort still remains of canal treatment, but which we are not warranted in resorting to until everything else fails, and we are compelled to devitalize. The rule should be laid down that every exposed pulp which is not on the verge of death, or whose prospects are beyond all hope, should have a chance at least for life and usefulness.

After the lapse of the specified time of probationary treatment in each case, the oxychloride filling should be removed, the paste taken from the bottom, and the carious dentine thoroughly removed to a safe depth. This safety-line will be found by avoiding encroachment upon the hard but discolored dentine, which must be left as the best protector of the pulp. This is well covered with the oil paste, which is carefully dried into position. A good capping of stiff oxychloride is placed carefully over the oil paste, and dried, the preparation of the cavity completed, and the metal filling inserted. This is the treatment which has been found most successful for exposures and large cavities, but in small cavities which were treated for sensitiveness alone, the oxychloride is removed and the cavity prepared and filled in the ordinary manner.

It will be found that in the majority of cases the sensibility to cutting will have subsided to a minimum of pain by this treatment, and that all cavities so treated will have been much benefited. In especially nervous and asthenic patients the benefits are sometimes not as great as we could wish, but even in the worst temperaments and most sensitive teeth the pain of preparation can be considerably reduced, while in all ordinary cases the benefit is very great. There can be no doubt that the reduction of sensation in irritated dentine is a great desideratum, and that extreme sensitiveness interferes very greatly with the certainty of success in filling. There is also no doubt that we do not possess, as yet, a safe and efficient means of obtunding and overcoming this sensitiveness instantaneously, so as to permit of deliberate operating. In view of these facts, the method above proposed is especially recommended as safe and certain, its only objection being that it requires a few weeks' time, but this should not be counted against it when the results are so important. Much the same may be said of the method of treating exposed pulps, for in this dangerous lesion the time required is surely justified by even a chance of success.

The danger to the life of the pulp is entirely obviated by the use of the intervening oil paste, which effectually protects this tissue and the canaliculi immediately leading to it from the caustic effects of the zinc chloride, while the tubuli of the periphery are either cut off entirely from communication with the pulp, or are at such distance as to not endanger it. The proof that the vitality of the pulp or dentine is not impaired in the least by the effects of the oxychloride is furnished by those cases which are unfortunately neglected until the filling wears and dissolves either partially or entirely away, again exposing the dentine and, perhaps also, the pulp, to the exciting irritants, when sensibility and pain will again ensue. This occurs only too frequently by the neglect of the patient to return at the proper time, and the whole process must then be repeated.

It is essential that great care should be taken during the introduction both of the oil paste and the oxychloride in cavities which approach the pulp or expose it, to avoid pressing with the spunk or instruments in the direction of the pulp with any force beyond that which is barely sufficient to dry the pastes. This care is so essential that a slight compression of the pulp, or even of the dentine over the pulp, will usually produce an amount of mischief and suffering that is one of the most difficult forms of odontalgia to overcome.

It will be found advantageous, in taking charge of nearly every denture for the filling and conservation of the teeth, to perform the operation (among other attentions preliminary to filling) of treating and filling every open cavity with oxychloride. The size and sensitiveness of each cavity will govern the method of its filling of course, and it will be found that much time will often be saved by this anticipation of sensitiveness. Very frequently a cavity will be exquisitely sensitive which has given no previous indication of such a condition, and in such a case anticipatory filling is often a very fortunate forethought. In the cavities of a denture so treated a little time can be given them while the lesser cavities are being filled permanently, so that by the time the treated cavities are reached one, two, or perhaps three weeks have elapsed, and the denture can be completed without any waiting for the treatment of sensibility or exposure. Whereas, if each open cavity had not been so treated in advance, some of them would have required time and waiting, and thus have caused inconvenience to both patient and operator, which might have been saved by anticipatory filling. Many dentures thus treated by the writer testify to the practicality and advantage of this system. One case recently completed illustrates this directly, in which thirty-five fillings were made in just one month, many of which, but for the filling of all open cavities at the first sitting with oxychloride, would have required treatment, and another month would have elapsed before the completion of the denture. In this case, as in many like it, no aching had occurred, but a few of the cavities were sensitive to mastication or the touch, but no pulps were lost, and much time was saved by immediate attention.

ALVEOLAR ABSCESS AND NECROSIS—SULPHURIC ACID VERSUS CREASOTE.*

(Read before the New York Odontological Society, Nov. 21st, 1877.)

BY J. N. FARRAR, M.D., BROOKLYN, N. Y.

No. I.

It is not my purpose in this paper to advocate any new remedy, nor to enter into a discussion of the histological causes of disease of the alveolar walls, nor to attempt explanation of the laws governing the intricate chemical actions and reactions of medicines upon diseased and dead tissue, but simply to give my estimate of some of the principal agents in use in this connection, and approximately their relative value in the treatment of alveolar disease. I shall also try to show *why* certain remedies are better adapted for the treatment of special cases than others, and why it is that, though best for one class of conditions, they may be contraindicated in others; that, while the creasote treatment is of special value in some cases, the acid treatment is of equal value in other conditions.

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* Partly on account of the author being ill at the time this paper was read before the Odontological Society, and partly because it seemed unnecessary to enter into elementary details before such a body, several passages intended for the instruction of the younger readers of the Dental Cosmos, for which the paper was originally intended, were omitted in the reading.

The agents recognized as curative in alveolar abscess range from pure water to sulphuric acid, including sulphate of zinc, carbolic acid, salicylic acid, iodine, nitrate of silver, Labarraque's solution, etc.; but, although any one of these will generally cure simple recent cases, and frequently chronic ones, by proper care and with sufficient time, yet the degree of their efficiency varies, showing that for some reason some are superior to others. It does not follow because a diseased tissue may be sometimes, or even generally, successfully treated by a certain method, that such is necessarily the most scientific. The wonderful recuperative power of nature is manifested by the response made to even slight endeavor to assist her. The wooden plow will do its work well, but no intelligent farmer will admit that it is equal to a steel plow.

To judge from office-practice reports at some of the "society" meetings, necrosis is more frequently supposed to be associated with alveolar abscess than I have found it to be in my practice. Although there are frequently, if not generally, remnants of former sacs associated, we seldom, if ever, I think, find a perfect sac accompanying necrosis. I have been in the habit of keeping a careful record of my cases. This record shows that there are about nine cases of simple abscess without necrosis to one complicated by necrosis. It is, therefore, important to determine upon a treatment which shall be suitable as a general rule.

Necrosed parts, if such exist, must, of course, be removed before a case can be permanently cured. This is sometimes accomplished by exfoliation, and by the use of suitable cutting instruments. If, owing to the inaccessible location of the necrosed part, it is impracticable to remove it by small chisels, gouges, or excavators, the application of acid, in proper strength, from time to time, is thought to be beneficial in hastening its solution. The drugs upon which I rely for general use are sulphuric acid and creasote. Each of these is useful in various degrees of dilution. Different varieties of creasote have different practical value. When or by whom creasote was first used in the treatment of such diseases I am not able to say, but as to sulphuric acid, as well as nitric acid, we find, according to Dr. Lawrence Heister, who wrote largely (in the German language) in A.D. 1718 (one hundred and sixty years ago), that it was then in general use in the treatment of necrosis of the jaws. Since this time it has been in use, more or less, in England and America.

Sulphuric acid, of which there are two varieties, the commercial (H_2SO_4*) and the Nordhausen ($H_2SO_4SO_3$†), has, with many, if not most of us, become almost indispensable. This acid, in its pure state, has not to my knowledge been employed by dentists in their practice, but the aromatic form, known as "elixir of vitriol," has been in general use. But, in order to obtain a more vigorous action, various degrees of dilution of pure acid, from four to ten parts of water to one part of acid, have proven more efficient for stubborn cases, where dead bone is associated. There are, however, some considerations respecting the acid treatment which, in my opinion, are of importance.

Different views are held in regard to the relative value of the commercial and the Nordhausen sulphuric acid. I shall not discuss this point at any length in this paper, and as I prefer the form known as Acidum Sulphuricum Dilutum (U.S.P.), for special reasons to be given, my remarks will be confined for the present to the use of that kind of acid. I am making experiments, however, to determine the relative chemical effects of these different acids upon all sorts of dead bone (three varieties); but, so far as my argument is concerned in the classification of cases, these points, though valuable, are not of *vital* importance. My desire is to find one form of acid solution that will not act vigorously upon dead bone, but will have a stimulating influence upon living tissues, without abortive antiseptic action.

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* COMMERCIAL SULPHURIC ACID, U.S.P.

The molecular weight of H_2SO_4 is 98.
The atomic weight of H is 1, thus $H_2 \times 1 = 2$
" " " " S " 32, " $S \times 32 = 32$
" " " " O " 16, " $O_4 \times 16 = 64$
Equals molecular weight of sulphuric acid 98

† NORDHAUSEN SULPHURIC ACID.

The molecular weight of $H_2SO_4SO_3$ is 178.
$H_2 \times 1 = 2$
$S \times 32 = 32$
$O_4 \times 16 = 64$
$S \times 32 = 32$
$O_3 \times 16 = 48$
Molecular weight 178

When Nordhausen acid is added to water in the proportion of 178 (by weight) of acid to 18 of water (by weight), it is converted instantly into commercial sulphuric acid, thus: $\frac{H_2SO_4SO_3}{178} + \frac{H_2O}{18} = \frac{2\,H_2SO_4}{196}$. Therefore, for aqueous solutions of this degree of strength there is no difference between the two acids.—CHANDLER.

Sulphuric acid is highly recommended by some persons for universal use in all conditions of abscess; but while it will frequently, perhaps generally, in certain localities, lead to fair results, and while it is undoubtedly to be preferred to creasote in cases of necrosis, and while I use it in the aromatic form in some cases, and occasionally in aqueous solutions of greater strength, I do not think that the indiscriminate use of sulphuric acid in the treatment of simple abscess, even though it be slightly antiseptic, is based upon scientific principles.

In cases complicated by necrosis, the acid treatment in some form appears to be indicated, but in simple abscess, where there is no necrosis, except at the apex of the root, we do not expect to remove even the dead apex, unless by means of an instrument, which it is sometimes well to do. It is impossible to cause exfoliation of the apex by establishing a "line of demarkation" through the use of remedies, and we should, therefore, aim to preserve the root by antiseptic treatment. Any drug that will do this, and at the same time cure the surrounding tissue, has a double value. Creasote has this double action to a high degree, while acid, so far as its action on the dead root is concerned, has not. Creasote has all the desired properties of sulphuric acid which are indicated in the treatment of simple abscess, with far superior antiseptic qualities, and as alveolar abscess is not, as a general rule, accompanied by necrosis proper, the former is superior to the latter for general use. Even in the cases where the acid is indicated, the final dressings, after the dead bone has been removed, may profitably be made with creasote, in order to secure its great antiseptic action, for the dead root is ultimately to be clothed like an encysted foreign body by the encroachment of the alveolar tissues, or by the walls of the cyst (if one be present),—formerly the periosteal membrane,—either by contracting around it, by granulations, or otherwise, thickened so as to embrace it.

It will be seen that, even under the most promising circumstances, this dead body is liable to become, by its disintegration, the exciting cause of inflammation, tending to re-establish the old, or perhaps form a new abscess in the place of the one that has been cured. This will depend upon the degree of its degeneration, the degree of antiseptic preservation, and upon the general health of the patient. This is one reason why old cases are more liable to rekindle than acute ones, after having once been cured; and when this takes place, it is often nearly, if not quite, as painful as the formation of the first abscess.

Two varieties of creasote should be considered, escharotic and non-escharotic. Pure "wood creasote" may practically be called a non-escharotic, and, though an excellent drug for the treatment of exposed pulps, and sometimes for the later stages of alveolar abscess, where it is not desirable to destroy tissue, it is not, I think, so valuable as the escharotic form, where, for first dressings and the general treatment of alveolar abscess, the escharotic property appears to be indicated. There are a few people whose peculiar idiosyncrasy will not allow the use of creasote without pain and sometimes swelling resulting. Such cases will often act kindly under the employment of salicylic acid, sulphuric acid, or Labarraque's solution. Happily for us, such cases are rare.

It is sometimes a nice point to determine whether there be necrosis present or not, when very limited in extent and difficult of access; but careful and skilled examination will generally reveal, by means of a delicate probe, the difference between living and dead bone. These are the cases which render the choice of medicines difficult to determine. Should there be, however, a doubt as to the diagnosis, and a suspicion of necrosis, it is my rule to give the patient the benefit of the doubt, and treat the case with acid,—the form and strength depending upon circumstances.

While creasote is thus highly recommended for general abscess treatment, it is of the utmost importance that a correct diagnosis be made before deciding what agent to employ. Should there be even slight necrosis present, the solution of the dead bone, so important to a final cure, will be arrested by the action of creasote, and the surrounding tissues will make an effort to retain the dead portion as so much partially encysted foreign substance. The formation of pus for the time being ceasing, the fistula may close, producing what may be called a false cure, which will remain so only so long as the effect of the creasote shall prevent further decomposition of the dead matter.

For several years I have had the subject of alveolar abscess and necrosis more or less under consideration, and from time to time I have been led to examine somewhat into the different methods of treatment common in the profession, in the effort to determine the question, "Which is the best medicine, and the best way of applying it?" In order to be able to operate more intelligently, I desired to settle, to my own satisfaction at least, the comparative chemical action of the different solutions of sulphuric acid upon the different varieties of dead ossific matter.

Chemical experiments upon dead tissue outside of the body, as illustrative of similar conditions in the living, are always open to criticism, often absurd, especially in the direction of physiological chemistry. The chemical action of acids even upon dead bone in and among living tissue is supposed to be somewhat different from their action upon outside dead matter.

How much so-called "vitality" influences the action of chemical agents is not well known. I will not attempt to discuss the question. Many of these physiological queries regarding cell-action are sometimes satisfactorily answered, but only on the basis of hypothesis. It is my belief that the difference in conditions of experiment is not a difference of chemical action, but only a difference in the degree of action. We have dead and dying ossific tissue, and wish to prevent further extension of death, and get rid of the necrosed portion. What shall be done? Will acid dissolve bone or not? If so, what preparation should be used?

What can we do instrumentally to hasten the separation of dead bone without injury to the surrounding living tissue? Is there any drug that will, when applied locally, hasten decomposition of the dead bone, and at the same time stimulate diseased living tissue to healthy action? Of course favorable influences upon the general health by remedies such as medicine, food, and sunlight will facilitate local improvement and have their value in hastening the "line of demarkation."

Necrosed bone is acted upon as well (other things being equal) *within the jaw as without*, but in actual practice "other things" cannot be made "equal," and therefore allowances must be made. So far as the action of acids upon dead bone *per se* is concerned, we have the matter in a nutshell. Necrosed bone can be dissolved by the use of acids; but as the result of my experiments, I have come to conclusions somewhat at variance with those generally held. The conditions in actual practice necessarily retard the action of chemical agents applied from without, even if an effort be made to retain them in place by tents of lint or cotton,—a practice in vogue since the days of Heister, 1718. A sequestrum of bone placed in a bottle containing an abundance of acid will show decided chemical action; but, if we apply the same drug in the practical treatment of necrosed alveolar process, the quantity must necessarily be limited to a few drops. The presence of pus-detritus in and around the necrosed parts, and the natural secretions of the same, dilute as well as drive out the small quantity injected, reducing the degree of its chemical action. We would therefore naturally infer that, in actual practice, a stronger solution would be necessary to accomplish the same degree of chemical action which a larger quantity of a weaker solution would accomplish out of the mouth. If so, then to what extent is this true? Leaving out, for the present, the alcoholic solutions, which I shall try to show have little or no practical disintegrative chemical power *per se* upon dead bone *per se*, a solution of about four parts of water to one of acid will not act upon necrosed tissue in the living jaw more than, if indeed so much as, a solution of about nine parts of water to one of acid on similar bone outside of the body if kept at the temperature of the blood.

The action of pure sulphuric acid being destructive to living soft tissues, we are obliged to use a weaker solution in practice. But a dilution that may be beneficial to living tissue is so weak that, under the difficulties before mentioned, it will not have so much disintegrative power on necrosed bone as might be supposed; yet there is no doubt that the frequent, long-continued use of some forms of acid solution (aqueous) will hasten its decomposition, and lead to an earlier cure of the diseased parts.

The question then is, "What kind of acid solution and in what degree of strength will be most beneficial?" I am satisfied from experiments and practice that an aqueous solution of sulphuric acid is destructive to lifeless bone; while, as before said, an alcoholic solution, such as the aromatic form, U.S.P., produces but little, if any, practical disintegrative chemical action upon it. To what extent these two kinds of solutions differ, and the relative degree of action of the various solutions of both, are questions that are to be further considered.

It would seem that, as the diseased part is so limited in extent, and as even the small amount of acid admissible can remain in contact with the parts but a short time before it becomes weakened or discharged with the exudations, we should, in order to obtain the greatest degree of benefit from its disintegrative action, make more frequent applications than are usually made (certainly more frequently than creasote when it is indicated), in order to saturate more thoroughly the necrosed part with the acid. I do not find that patients realize much difference, so far as feeling is concerned, between the weaker and stronger solutions. When I use an aqueous solution of one to four, the patient sometimes says a slight burning sensation is experienced for a few minutes; but with respect to the use of solutions of one to seven, eight, nine, and ten, it is seldom that he remarks any peculiar sensation. It is well, however, to begin with the weaker solutions, and from time to time increase the strength until it begins to occasion a more or less constant feeling of soreness. Such complaint may be accepted as evidence that the maximum degree that will benefit that patient has been reached.

There is one feature of the acid action upon dead bone that "tells" in favor of the acid treatment, viz., that the destructive activity of aqueous acid solutions generally increases with the increase of duration of time the bone is exposed to it. My attention was first drawn to this fact during a series of experiments for other purposes. Three different equal parcels of bone and teeth were submitted to aqueous solutions containing the same per cent. of sulphuric acid which is found in the aromatic form, which were held at a regular temperature of 100° Fah. for twenty-four hours, when the bones and teeth were removed, leaving a certain amount of precipitate in the bottle. Two of the three lots were again submitted to a second bottle of similar, but fresh solutions, under the same conditions, for another twenty-four hours, when the bones and teeth were again taken out, leaving about twice as much precipitate from these two lots as was formed from the three lots during the first twenty-four hours. Leaving another parcel out, and submitting the third lot to a fresh solution of the same strength for another twenty-four hours, under precisely similar conditions, it was found that the same quantity of precipitate had formed from this last lot during the last twenty-four hours that was formed from double the quantity of bone and teeth during the second twenty-four hours, and twice as much as was formed from the three parcels during the first twenty-four hours. In order to further satisfy myself, the same sort of experiment was again made, under the same conditions, with similar results.

Before continuing to narrate the results of other experiments, made for the purpose of ascertaining the proximate relative degree of chemical action of different solutions of sulphuric acid upon lifeless bone, I wish to classify dead bone, in order to more intelligently express myself.

"Dead bone" is a general term for lifeless bone, of which there are three classes:

1st. That which has suddenly died from violence, such as that to which the ox is subjected at the slaughter-house.

2d. That which has died at the dissolution of the general system, by disease (more or less lingering) of some organ, such as lungs, liver, or brain.

3d. That which has died of disease within and of itself.

This last division may again be subdivided into two varieties,—bone which has died, as in caries, illustrated in the soft tissues by ulceration; and where death has resulted because of a low form of vitality, illustrated by gangrene in the soft tissues. This last subdivision is called necrosed bone proper.

(To be continued.)

ABRASION OF THE TEETH.

BY C. A. KINGSBURY, M.D., D.D.S., PHILADELPHIA.

[Abstract of a Paper read before the Alumni Association of the Philadelphia Dental College, February 27th, 1878.]

John Hunter, who wrote one hundred years ago, appears to have been the first writer to describe the affection under consideration, which he termed "decay of the teeth by denudation." Candor compels us to admit that no considerable amount of knowledge has been gained of certain modifications and forms of this condition since his day.

The number of patients coming to me during the last few months with teeth in this condition has stimulated me to thought upon the etiology of the affection. There would be a special satisfaction in discovering the secret forces—the hidden agents—that carry on this mischievous work; in subjecting them to the light of scientific investigation; to the crucible of experimental demonstration. But nearly all efforts, so far, to explain the etiology of this abnormality have been more or less unsatisfactory. I am inclined to think that it will be found usually to depend not on any single cause, but rather a combination of causes.

The condition of which I speak must not be confounded with that affection known as atrophy, which is manifested by white, chalk-like spots upon the enamel, and which are coeval with the eruption of the teeth, and limited to the enamel tissue, while the affection under consideration involves the destruction of the enamel and dentine alike.

The form of disease here spoken of affects the incisors and cuspids of the upper jaw more frequently than any of the other teeth. The enamel on the labial surfaces becomes very thin at first, and then a transverse groove is formed at the necks of the teeth. In some cases which have recently come under my notice, the centrals, laterals, cuspids, and bicuspids were all involved. The erosion—as this form of abrasion is sometimes called—continues until the substance of the teeth is cut one-third or more of their thickness, and the pulp so nearly exposed as to cause irritation and pain, followed by inflammation and death of that organ. These grooves have the appearance of having been highly polished, with little or no discoloration of the dentine. The same condition of things will frequently be found in the lower teeth. Owing to the position of the abraded surfaces in such cases, it is manifestly not due to attrition from mastication.

The first suggestion which I have to offer is, if there may not have been defective organization in that part of the teeth affected, predisposing them to this form of solution. Again, may there not be present in the margins of the gums adjacent, certain mucous follicles, secreting a fluid of acid reaction, and with solvent properties, or may not a like fluid be secreted from the mucous surface of the lips? In all cases of irritation of the gums, but especially in acute or chronic inflammation of that tissue, the secretions are markedly acid in character.

But making all allowance for the agency of any acid which may be present in dissolving the enamel and dentinal tissues, according to the laws of chemical affinity, I am satisfied there are at least two other agents which, combined, are largely responsible for this work of slow but sure destruction. I refer to hard tooth-brushes and coarse, abrasive tooth-powders. Patients, as a rule, hold the opinion that a soft, elastic brush is insufficient, and when left to their own choice, procure those so hard as to be utterly unfit for use. To make the case worse, they employ dentifrices containing coral, pumice, or cuttle-fish bone, and which, in conjunction with a hard brush, can hardly fail to produce that form of abrasion which we are considering. In nearly all the strongly-pronounced cases which have come under my notice, I have invariably found that those teeth were most seriously affected which were most prominent, and therefore most exposed to the friction of the brush and the abrasive action of the dentifrice. I have observed, also, that in the case of right-handed patients, the teeth on the left side suffered more than those on the right, while the converse was true of left-handed persons.

Now, as to the treatment:

First, patients should be admonished of the injurious effects upon their teeth of hard tooth-brushes and abrasive powders. They should be advised that, for ordinary daily use, no dentifrice should be employed which contains any material less fine or more abrasive than the best quality of precipitated chalk.

Second, when the mischief has already been done, and the transverse grooves are found on the labial surfaces of the incisors and cuspids—sometimes on the buccal surfaces of the bicuspids and molars—deep enough to render the teeth sensitive to thermal changes, and favoring the retention of food, the operation of filling is clearly indicated. In the performance of this operation, the dentist will frequently find it necessary to call into requisition his highest skill and his greatest patience.

In the preparation of such cavities—which usually extend quite across the labial surfaces of the teeth—it is my practice to form at the termination of the cavity on each side of the tooth a well-defined retaining-point, slightly undercut on the termini. The cervical wall contiguous to the gum I also undercut; the opposite side of the cavity—that nearest to the cutting edge of the tooth—I cut at a right angle, or nearly so, to the labial surface. This form of cavity, where we can obtain it by careful drilling and excavating, I have found most favorable for a permanent operation. When gold foil is used,—and, the views of some practitioners to the contrary notwithstanding, I prefer it as a rule to any other material,—I commence to fill with cylinders or pellets, as my judgment may dictate, at one end of the cavity, and proceed along the upper undercut wall, packing thoroughly and solidly against this wall to the end of the cavity. Up to this point I generally use soft foil No. 4 or 5; then small cylinders or pellets, heated to a dull red, which, by well-directed pressure, with a finely-serrated plugger, I impact, incorporating it with the soft foil previously used, keeping that part of the filling next the gum most prominent, and introducing the last portions of gold on the side of the cavity nearest the cutting edge of the tooth. By this method a layer of soft gold is placed upon all the walls of the cavity except that nearest the cutting edge of the tooth. Observation of my practice in this respect for many years has led me to regard the plan with great favor, securing, as it does, a combination of the advantages of the wedging and welding processes, and the most favorable condition of the gold for perfect adaptation with the parietes of the cavity.

There is another variety of the affection under consideration, differing somewhat from that already noticed, and more rarely met with. A case of this kind presented to me some months since. The front teeth had a truncated appearance, as if they had been squarely broken or cut off. The central incisors were not more than half their natural length; the laterals nearly as short. The cuspids and bicuspids had also suffered, but not to the same extent. The lower teeth were similarly affected, but not as badly as the upper. Upon closing the jaws an elliptical space was formed, three or four lines in width, between the centrals of the upper and lower jaw, diminishing towards the cuspids. The patient stated that the shortening process had been gradually progressing for several years. It was a well-marked case of what is termed by some authors spontaneous or chemical abrasion. This condition was certainly not due to attrition or friction of any kind. Is it not probable that in such cases there is structural imperfection of the hard tissues, rendering them incapable of resisting the action of chemical solvents when taken in the form of food or drink, or which may be eliminated under special pathological conditions of the system by certain mucous follicles or glands? A German physician claims to have discovered a gland in the tip of the tongue, the ducts of which pass through the mucous membrane. Now, if, as has been suggested, this gland secretes an acidulous fluid, which is constantly brought into contact with the cutting edges of the oral teeth, it would not be so difficult to account for this peculiar loss of substance.

A third variety of abrasion, more common than either of the preceding, is a loss of the substance of the teeth upon their cutting edges and grinding surfaces, resulting from mastication. This form is usually met with in patients in mid-life or advanced age. Where the occlusion of the teeth is such that the cutting edges of the incisor teeth of both jaws meet, instead of one overlapping the other, the abrasive action is increased, owing to the greater lateral motion thus afforded to the inferior maxilla. In some cases, owing to this wearing process, the oral teeth have become so short as to give rise to the idea that such persons have what are termed double teeth instead of incisors and cuspids. Even when the occlusion is perfectly normal, owing to the absence of molar teeth in either jaw, we find some of the worst cases of abrasion. From these various causes of abrasion a large amount of trouble and suffering arise, demanding special attention, and often special skill in their treatment, to insure success.

Many interesting queries are suggested in connection with this subject, such as the relation man's teeth bear to his longevity, their adaptability to his food, etc. The hardness of the human teeth, according to Mohr's scale, is about six for the dentine—equal to feldspar—and seven for the enamel, the equivalent of limpid quartz. But a degree of hardness equal to that of the diamond—which ranks as ten—would have been requisite to meet the necessities of such long-lived men as Adam, Seth, and Methuselah, whose teeth had to do service for nearly a thousand years. As to the requirements of some of our modern tobacco-chewers, whose teeth are subjected to almost incessant attrition, nothing short of teeth with persistent pulps, securing constant renewal, as in the beaver and other rodents, would be adequate to meet their demands.

From whatever cause or in whatever form this affection shows itself, it is our province to meet and to combat it; whether from original defective structure, from mal-occlusion, from mechanical abuse by brush and powder, or from persistent mastication of the filthy weed, it is ours to restore lost parts, to build up that which is broken down, to guard the weak places, and, by capping, contouring, and crowning, to work in harmony with the conservative forces of nature in maintaining, it may be to the end of life, the dental structures of those who place themselves under our care.

TRANSPLANTING.

BY G. R. THOMAS, D.D.S., DETROIT, MICH.

WITH me the operation of replanting has become so common, and the results so uniformly satisfactory, that now I do not hesitate to extract any tooth in the mouth, if the case demands it; and I find the cases that demand it multiplying continually,—not that the cases that demand it multiply, but the number I have operated upon, and the observations made, have so strengthened my confidence that whereas I was once *blind*, I now *see;* not with my mind's eye, *either*, but with the physical eye, I see the end of the root or roots of nearly all my cases of abscessed teeth; and a record of more than one hundred and fifty cases, with but one loss, and that in the mouth of a man so timid that he utterly refused to bear the pain which nearly always follows for a few minutes,—being compelled to re-extract it within a very short time.—convinces me that the operation is not only practical, but decidedly beneficial to both patient and operator. For one sitting is all that I have ever really found necessary to the full and complete restoration of the case.

But my object in this communication is not so much to speak of *re*planting as of *trans*planting, which I have reason to believe is just as practical, so far as the mere matter of *re*-attachment is concerned, as is replanting; and I believe there are but two obstacles in the way of its perfect practicability: first, the difficulty of obtaining the proper teeth at the proper time; and, second, the possibility of inoculation. And the latter I regard as by far the most formidable of the two, for I do not regard it as a necessity that the tooth transplanted should correspond exactly in size and shape to the one extracted. If it is a little too large, it may be carefully reduced; or if too small, new osseous deposit will supply the deficiency.

But in order to escape the ills that might follow from the second obstacle, I believe we should use the greatest caution. It is not necessary that the transplanted tooth should be a freshly-extracted one.

Last winter, Mr. N. C., a gentleman about thirty-five years of age, was under my care for the treatment of his teeth. His front teeth were, for the most part, very fine and conspicuous. The right superior cuspidate had been filled some years previous; filling had been leaking, and having been neglected, the crown had wasted away till nothing of the tooth remained, when he came under my care, save a large, hollow root. I made an attempt to pivot, but found the shell too frail. On the last day of February I extracted the root by the use of the screw, and took a corresponding sound tooth that I had removed from a lady's mouth, about the same age, just four weeks previous, in preparing for an artificial set (it being the only sound tooth in the upper jaw, it was thought best to remove it). I opened into the canal and pulp-chamber from the apex of the root *only;* cut the end off one-eighth of an inch, it being that much too long; reduced the size somewhat in the center of the root, it being a trifle larger than the root extracted, filled and placed in position.

The occlusion, shape, and color were perfect; so much so that several dentists who saw the case within a few weeks after the operation, and being told that it was one of the superior six front teeth, and requested to point it out, were unable to do so, among whom were Professor Watling, of Ypsilanti, and Dr. Haskell, of Chicago, who remarked "that it was well worth coming from Chicago on purpose to see."

Perhaps some one is ready to say, "It being pulpless, it certainly must have been discolored." I think such a one would be surprised to see the life-like appearance that this tooth retains; and I think the reason is obvious. When the dentist (or nature, through neglect) produces death of the pulp in the ordinary way, the fluids of the tooth are immediately changed in color, not only from the effect of the poison that may have been used for the purpose of devitalization, but from the leakage that I believe *always* takes place into the tooth, through the foramen at the *apex*, after filling the root-canal and pulp-chamber when the tooth is retained in the socket.

I have had occasion to examine the roots of a *great many* teeth that have been filled to the apices, as has been claimed by those who have a reputation equal to any in the land. But I have never yet found *one* that was filled thoroughly to the apex. I have occasionally seen one where there was some filling at the apex, and even through the apex, but when opened up and examined, it would come far short of a perfect filling. And I believe the imperfect treatment of this apex is THE point of prolonged trouble in the treatment of abscessed teeth; and this is the vantage-ground in the replanting or transplanting operation. The apex is *thoroughly* filled, leaving no opportunity for the operation of poisonous gases; therefore my opinion is, that if it is found advisable to devitalize, extraction, filling both crown and apex, and replanting, is by far the most successful and satisfactory mode of treatment. The perfect filling of the root explains, I think, the reason why the transplanted tooth has not changed color. In cases where replanting is demanded (except those of immediate destruction of the pulp) for the cure of abscessed teeth, we invariably find the tooth already discolored.

The two features I wish to make prominent in this case are, that notwithstanding the fact that the tooth was four weeks in my office, *there is no perceptible change in color*, and the re-attachment is as perfect as though it had been *transplanted* or *replanted* the same day of extraction. It has now been more than three months since the operation, and the patient informs me that he has known *no difference* between it and any of his other teeth since the first four weeks.

A PLEA FOR COHESIVE GOLD FOIL.

BY THEODORE F. CHUPEIN, D.D.S., PHILADELPHIA.

Within the past year or two there has been apparent in the discussions of dental societies and in the contributions to dental journals, a tendency on the part of the profession to return to the use of soft or non-cohesive gold foil. This reaction we believe to be due to the failure of operations, noticeable especially at the margins of proximate fillings, and which has been, as we think erroneously, ascribed to the use of cohesive foil.

The discovery of the cohesive property of gold foil has, we think, done more for dentistry by the facilities which it has afforded for manipulative skill, than perhaps any other discovery which has been made within the last decade and a half. This is true not only of those who have entered the profession within the period named, but also of very many practitioners who were not above availing themselves of the advantages offered by this discovery.

The value of this cohesive property of gold foil has been recognized; has been considered so much of an improvement; has so simplified heretofore difficult operations; has been so generally adopted; the dental colleges have so almost exclusively taught this style of work; it has been so generally illustrated in dental clinics, and has been used by so many of the best men in the profession, to the exclusion of every other, that the tendency to which we have alluded to return to the use of non-cohesive foil must, it would seem, be due to a conviction that in some essential quality it has been found wanting.

We believe that the explanation of this tendency to abandon the use of cohesive foil is the dissatisfaction with the failure of so many operations,—decay around the margins of fillings. These failures, it is said, and I grant it, were not nearly so frequent in the operations of our predecessors, who used only non-cohesive foil; but the conclusion that modern failures are due to the use of cohesive foil I very much doubt. If this liability to fail were justly attributable to the use of cohesive foil; if the defect were in the gold itself, why should it be liable to failure at one point more than another? The failures are almost invariably in proximate fillings, seldom or never in fillings on the buccal and masticating surfaces of molars or bicuspids, or in the labial or palatal surfaces of incisors or cuspids. In view of these facts, if cohesive foil is capable of preserving teeth in the localities named, why should it not be capable of preserving them in those other localities where the failures occur?

It is true that ordinarily decay of proximate surfaces is more difficult of approach and operations more difficult of execution, and failures at such points have to be acknowledged by our most skillful manipulators. To avoid this tendency to decay around the margins of fillings in proximate cavities, some advise and practice lining the cavity—especially at its cervical border—with non-cohesive gold, filling the remainder with cohesive foil. We do not believe that the presence of non-cohesive foil at the cervical border of a proximate cavity, or around its entire circumference, has anything to do with, or that it will be any guarantee against, failure at these points. Cases are cited in which fillings have remained and preserved the teeth for forty years not alone in the positions mentioned, but in all localities. When we examine such fillings, we are often astonished to find how carelessly they have been performed,—edges rough, surface full of pits, concave instead of convex, the attempt at *contour*—the rage of to-day—not having been even attempted. The integrity of such fillings is claimed as proof of the superiority of the form of gold employed in those days.

In reference to these old-time fillings, it must be admitted that the teeth of those days were generally of better structure than we find in the mouths of the patients of to-day; yet neither the quality of the teeth nor the character of the foil employed accounts for the preservation of the fillings, but the manner of operating. Teeth were not then wedged apart to obtain room, filled and allowed to come together again as now; but in all proximate decays permanent separations were made; large self-cleansing spaces were left; heavy shoulders, perhaps, were cut at the necks of the teeth on their palatal aspects, and then fillings were inserted. The consequence was that such fillings were kept as free from all accumulation of food on approximate as on buccal, labial, palatal, or masticating surfaces. To this fact and to this alone, other things being equal, we attribute the integrity of these old-time operations, and not to any particular preparation of foil or character of teeth.

While we write a case presents. The four superior incisors are filled and contoured in their labial surfaces, but between the central and lateral, and between the two centrals, sufficient of the tooth-substance has been removed from their palatal surfaces to admit of easy cleansing, while between the other central and lateral no such self-cleansing space had been made. At this point decay has recurred, while the other fillings remain intact. These teeth were filled ten years ago entirely with cohesive gold.

It matters not what the qualifications of the operator; how thorough his operations; how artistic and beautiful the results, the causes which produced decay at first—the accumulation and retention of food between the teeth—will produce decay again at these points. Even admitting that, if patients will be forever minding their teeth,—always brushing, always picking, always washing,—they may, by this ever-scrupulous care, prevent the recurrence of decay, how many can we induce to this constant watchfulness?

It is not, therefore, the preparation of gold employed, but the common-sense style of operating, which produces favorable results.

A recent contributor to the Dental Cosmos (May, 1878), writing on soft foil *versus* cohesive foil, says that soft foil takes a better impression of the cavity than cohesive foil, "and as the wedge principle gives more lateral and effective strength, a closer union between the walls of a cavity and the gold can be obtained."

We questioned this statement as to the relative impressibility of soft and cohesive gold, and resorted to the following experiment: taking a piece of No. 4 soft foil ("Quarter Century"), we folded it on itself very smoothly some sixteen times, of which we made two squares. Laying a half-dime on a table, we placed the square of non-cohesive foil on it, and applied pressure with the ball of the thumb. The other square we thoroughly annealed, and then subjected it to the same pressure. The result was, the annealed square showed a much sharper impression than the other, the difference being plainly perceptible by the naked eye, and much more apparent under a magnifying-glass.

The writer already referred to also asserts that to use cohesive gold requires, in many instances, the cutting away of much of the tooth-structure. This we admit, if the mallet—hand, automatic, or electric—be used; but we are not confined to the use of the mallet, and a filling can be made quite as solid, or as solid as there is any necessity for, with hand-pluggers as with any mallet in use, provided the operator sticks to the adage, "Make haste slowly," or, in other words, uses small points and packs his gold in small pieces. Indeed, we think cohesive foil is of the most advantage in small and very small cavities, and in such cases as are illustrated in Dr. Weld's article, already referred to.

We cannot see any necessity for cutting away good, strong pieces of enamel, destroying valuable tooth-substance, merely to obtain direct approach or direct pressure. We cannot admit that "the most essential requisite to success" with cohesive foil is "direct pressure." Furthermore, if we understand the meaning of the cuts on page 265 of the May number of the Dental Cosmos, we think the wedging principle inapplicable in this case, and would not like to try it for fear of losing the outer plate of enamel. On the other hand, cohesive foil could be packed against it intimately, solidly, securely, and safely without risk of fracture.

In conclusion, we believe that cohesive foil is in every respect equal if not superior to soft foil, applicable in a larger number of cases, and specially adapted to some cases in which soft foil cannot be used to advantage; the sole requisite with it, as with soft foil, in proximate cases, being free separations,—permanent self-cleansing spaces.

TRANSLATION.

DENTAL ANOMALIES FOUND IN MAN, AND THE MAMMIFERA AT LARGE. ANALYSIS OF THE RESEARCHES OF DR. MAGITOT, BY DR. TH. DAVID.

Numerous and varied are the anomalies of the dental system, and most important to be understood; yet up to the time of the services rendered science by the production of Dr. Magitot's work, all facts relating to the matter had to be looked for among documents scattered in every direction, and having no connection by which the literature of the subject was to be traced. To M. Magitot is to be accorded the greatest credit, seeing that in some way or other he has got hold of, and bound up in a volume, all these odds and ends, and, what is of infinitely greater import, he has so arranged and classified these anomalies as to afford the practitioner at large an interpretation of them.

As was established by Saint-Hilaire, the immortal founder of Teratology, all troubles arising in the organization have origin in embryonic defect; it is there that the seat of disease is to be sought. The study of an anomaly existing in a given organ commences with its embryonal peculiarity. With this understanding, one has no difficulty in recognizing the cause for the little that is known concerning the peculiarities in the dental system. Dental histogeny is a direction of science that has revealed its mysteries to but few. To even appreciate the labor expended in the discoveries made by Kölliker and Waldeyer, in Germany, and by Ch. Robin, Legros, and Magitot, in France, costs in itself great zeal and research. To these are we indebted for everything actually known of the embryogeny of the teeth.

Taking as a guide his personal work, and that done by the others named, Magitot, using in the task his extensive special and general knowledge, has proved himself a most proper person to make up the sum of the conclusions. What Geoffroy Saint-Hilaire has done for general teratology, Magitot has done for the monstrosities of the dental system.

Magitot calls all dental anomalies deviations from the specific type; that is to say, infractions on the law which determines the conditions expressive of the evolution. In the comparisons to be made between embryogeny and anatomy it is also exhibited lies the appreciation of phenomena associated with the diverse troubles of abnormal development, of suspension, of complete detention, and of hypertrophy.

In studying morphology, Magitot found himself led to look on the dental display in the animal series as being derived from a single primordial origin. This primitive type, or dental unity, the agent-principle of the conoid aspect, is found in a simple form in the very lowest of vertebrata. Fishes are found provided with teeth in great numbers: all more or less conoidal in shape. This is on the common principle that nature, always faithful to unity, modifies only according to requirements. In the more highly-developed organisms of man the cusps of molars are recognized as modifications only of that which is the primal type. It is not, however, the case, that modifications which present in the ascending scale follow always rigorously in a zoological order. One is, however, able to say that, from a general method, the primitive type is forsaken according as the teeth diminish in number; the less the number the more complex being the form. The studies of M. Magitot are directed generally to that view of the subject which considers it from the stand-point of principles; his anomalies follow in the series of mammifera. He shows us the essential relative character. He makes us see by example that what is normality in one species is abnormality in another; that many of the anomalies constitute in truth phenomena of return to one of the coherent halting-places, expressive of the morphologic changes of the dental types. Pursuing farther, in man, these philosophic studies, the author is drawn to establish certain deviations seen in the dental system representative of the human species as unquestionable anomalies that take an ethnological character.

But the point, certainly the most original with M. Magitot, is that which has for its subject the teratogeny proper of dental anomalies, and which are divided by him, following the anatomical method, into nine classes:

1. Anomalies of form.
2. " " volume.
3. " " number.
4. " " setting.
5. " " direction.
6. " " eruption.
7. " " nutrition.
8. " " structure.
9. " " arrangement.

The first in rank of the causes and laws which preside at the production of the greatest number of the dental anomalies is hereditary influences. The hereditary transmission alluded to by M. Magitot exists in that sexual affinity which may continue through generations, or which, by relation with new sexual influences, may suddenly disappear; and which, assuredly in time, will disappear by reason of that natural law which of itself tends to the correction of irregularities.

As illustrative of M. Magitot's manner of dealing with his subjects, we direct attention to a few of his conclusions. "Number," he suggests, "lies in secondary buds. The irregular development of a bud explains the anomaly by numerical augmentation; absence of a bud explains absence of a tooth." Deviations in setting Magitot attributes to simple displacement of a tooth on the jaw, or in the neighborhood of the unrolling epithelial cord through which tooth-buds are related, and to the consecutive migration of the membrane forming its cyst. The great difference in jaws leads our author to discuss as a prominent feature in teratogeny certain deviations in the epithelial structure, which deviations allow of the development of a tooth after that same manner in which neoplasms come into existence, namely, by the migration of tissues from neighboring parts.

Apropos of the anomalies of structure, M. Magitot advances a very interesting question, namely, that the corrosive markings of permanent teeth, congenital alterations in shape, furrows, indentations, etc., often considered, most wrongfully, as a pathognomonic sign of predisposition to certain diseases, the hereditary syphilis, for example, are to be esteemed as indelible and permanent traces of invasions of infantile affections, especially of convulsions. If this inference, based on a certain number of facts, but still contested, is found verified, the hypothesis put forth by Broca, that the prehistoric trepanations of children affected with convulsions was for the purpose of permitting the escape through the opening in the skull of a malicious spirit, may be accepted as the true one.

The whole of the work of M. Magitot is to be accepted as a contribution to teratology. If we insist that the work is to be looked upon in this light, it is because to our mind it constitutes both the interest and originality of the researches. This is not to imply, however, that the chapters devoted to divers kinds of anomalies should be less interesting; for, besides descriptions of types, numerous and varied, the author has introduced some pathological, and especially therapeutical considerations, which give to them, from a philosophical point of view, a character truly practical and surgical.

The book of M. Magitot, therefore, recommends itself by important qualities, and ought to be read by the physiologist as well as by the surgeon.—*Archives générales de Médecine.* A. B. C.

PROCEEDINGS OF DENTAL SOCIETIES.

NEW YORK ODONTOLOGICAL SOCIETY.

(Continued from page 344.)

The following discussion ensued upon the paper read by Dr. W. F. Litch, entitled "Patent Rights and Copyrights in their Relation to Professional Ethics."*

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* This paper was published in the reports of the Odontological Society in the June number of the Dental Cosmos.

Dr. W. H. Dwinelle. The paper upon the subject of patents is one that I fully agree with. There is nothing in the whole range of art or science but that can be made tributary to our profession. That being the case, it is eminently proper that all contributions to its advancement should be as free as the air we breathe, and untrammeled by any system of monopoly. It is mean and dishonorable for us to accept the accumulated benefits and treasures of the past, freely given to us, and selfishly withhold our fractional quota from the present and the future, to whom it is fairly due. We have no right to call ours a liberal or noble profession while we are thus illiberal and ignoble. We have no right to call ours a truly humanitarian calling, when we put metes and limitations to our good deeds; when we put a *price* upon that which it is not ours to sell.

The distinction lies here that ours is, or should be, a humanitarian profession, governed by the great law, accepted of all high and beneficent civilization,—that we have no right to withhold that which may alleviate or overcome the woes of humanity, because our common humanity allies us to all human woes, and makes them our own; we belong to the great brotherhood of sorrow, and are so completely merged in it that we are a part of the whole, and no selfishness can segregate us from it, and no attempt at seclusion can avail us.

Dr. John Allen. I have been connected with our profession some forty-six or forty-seven years, and I find it is advancing all the time. For many years after I became a dentist there was nothing said about patents. At length a gentleman in our profession had the audacity to secure a patent for an improvement he had been laboring for many years to perfect. Having proved its practicability, he secured a patent for it; but a short time subsequently a strong feeling was manifested against dental patents, and consequently this gentleman withdrew the privilege of pressing his claims upon the profession, although they were thoroughly attested and sustained by the United States Court as good and valid. This gentleman bestowed a great deal of time and labor upon his discovery, and then relinquished it to the profession, and exerted himself, at great personal sacrifice, to extend and enlarge its usefulness. There is an advantage in securing a patent for an important improvement. Being placed upon the national records of the country, it is validated against any subsequent infringement.

Dr. J. B. Rich. From the stand-point of exact justice, I do not see why any man who makes an invention in any profession has not a right to receive the same benefit from it that he would from any other production of his brain.

There is no justice in the position assumed by some professional men when they assert that, because a man belongs to a profession which claims to be liberal, he shall not patent anything that is mechanical connected with that profession. His mere mental development, or the result of mental culture, the foundation of which has been contributed by others of the same profession, he is allowed to copyright, and it is considered right that he should do this, on the principle that by such arrangement he is paid for the labor of elaborating and preparing his ideas for the public benefit, so that the knowledge can be disseminated in a cheap form; whereas, if it was issued in manuscript or privately published it would cost so large a sum that it would not be available to those for whose benefit it was written. A member of this profession devotes a certain amount of time, thought, and money in elaborating and perfecting an appliance, which, when so perfected, is useful to the other members of the profession; where did they acquire the right to demand of him that they should be allowed to use the result of his brain-work for their own benefit, without paying him for it? They will charge their patrons for the very service they render them, in which they make use of his invention, and, in all probability, it will enable them to perform such service with facility and success. Why should the professions of Medicine and Dentistry be exempt from the operation of that law which, in every other position in life, is considered a just and proper law? The privilege accorded to persons who obtain patents for their inventions has been one of the means by which our country has become pre-eminent in the useful arts, and there is no one calling that has been more benefited by patented inventions than dentistry has; witness how large a number of patented appliances are used in its practice that could not now be dispensed with. We cannot, as a profession, do without patents; let us, therefore, act in a spirit of fairness and liberality to the inventor, who helps us with his ingenuity, and pay him for what he does to benefit us, and give up this unmanly, unjust, and narrow-minded habit of protesting when inventors demand their rights of us.

A paper was then read by Dr. W. G. A. Bonwill, of which the following is an abstract:

Mr. President,—This nice distinction brought out by Dr. Litch is neither right in fact nor in theory. The records of law, to which we should look for light upon this subject, make no such distinction.

From the remotest periods every form of government has framed such rules or laws as best to protect itself. Self-preservation is the Alpha and Omega of all law. The government protects itself by protecting the individual. Instead of laws being made to kill the industries of a country, every nation, without regard to its form of government, for the past two hundred and fifty years in particular, has paid such special attention to its patent laws that every year adds something to enhance their value. The common law, as well as the patent law, recognizes no difference between a patent right and a copyright.

It is a recorded fact that the first regular patent granted in England, and in the world, was to secure to one person "the sole right of printing the weekly bills of the prices of all foreign commodities for the term of fourteen years," dated June 24th, 1634. The next granted was for an article of machinery, but all coming under the same head of patents. At the present time the substantial identity in principle and practice between a patent, commonly termed, and a copyright is illustrated by this, that an industrial design, which in England and Canada is secured by copyright, is in the United States protected by a patent. That patents and copyrights were in this country from the outset considered as identical in character, is shown by that paragraph of the Constitution upon which all Federal legislation concerning either is necessarily based, and which reads as follows: "Congress shall have power . . . to promote the progress of science and the useful arts by securing for limited times for *authors* and *inventors* the exclusive rights to their respective *writings* and *discoveries*." How can any one in the face of such language attempt to draw such a line of distinction as to say that a citizen of this country who has made such an invention as the steam-engine, the telegraph, the sewing-machine, or the reaper, has not the right to the same protection as the citizen who merely writes a book, a piece of music, makes a picture, a map, or some fancy design?

Gentlemen talk of professional ethics! What is meant by ethics? It is that moral law which commands us to "render unto Cæsar the things which are Cæsar's;" to give to every man the privilege of enjoying his own property in his own way, whether he has made it by double effort of brain and hands, as an inventor, or by simply placing his thoughts on paper, as the author or designer. It is a law of our social life which commands us to respect the inherent rights of our fellows, in such a practical way that, if Mr. A. has, by his brains and hands, managed to accumulate a fortune we have no right in common with him to enjoy the results of his labors, let them be what they may. If a citizen makes a machine that will do the work of ten men, saving thereby thousands of dollars per year to himself, has another citizen a right to that machine such as he has who first invented it, but who keeps it a secret, and issues publicly only its products? He who advocates such principles must legalize the idea of the Paris Commune,—the idea that those who have gained more than others shall be compelled to distribute. Ethics—Justice is its synonym—is the recognition of every man's rights.

Which is entitled to the greater respect, the profession in their *bull* against patents and patentees, or the nations of the earth who have framed these special laws? All governments of any significance protect citizens in the right of property; and in order that the public may have the privilege of enjoying the results of invention and discovery, they have thought it the highest justice and wisdom to frame laws offering inducements to inventors to give the benefit of their inventions to the public, guaranteeing to secure them for a certain number of years the right to their exclusive sale, thus insuring to them and the public the greatest good.

Most inventions are at first so crude as to require the fostering care of the government; most of them pass through decade after decade before becoming valuable; or, if valuable at first, are opposed because thought detrimental to the interest of some trade.

A patentee is thereby encouraged to spend his time and money, and thus to give to the public in the end, that which he never could or would have done without some such security.

The same law that applies to copyrights applies to patents. There is no difference, and every nation so regards it. Are patentees, then, justly excluded from societies on the ground of *professional* ethics, when copyrightists can enter freely?

On what principle of justice and equity can a society of professionals abrogate a law of the land, a clear article of our Constitution?

It can only be done on the common principle of resort to the will of the majority.

Professional ethics! Does any one ask the ostracism of patentees from the society of professionals, yet fellowship the authors of books, copyrighted by the same authorities who legalize patents? If the public have a right to the *labor* of any man without reward to him, then the author should give freely his manuscript to the publishers without profit to himself.

How many books do you suppose would be published if the publishers had no copyright thereon to secure them in the outlay of their money? They have to risk the first publication, and must have some guarantee that the profit will come to them for such risk. It is the same way with inventors. No capitalist can be found to enter into a scheme for manufacturing an article, I care not how good it is, unless the company furnishing such capital can be assured that they can have exclusive control for a limited time; that the first outlay will be sure to be repaid. It is only by manufacturing any article by the quantity that the company can place a price on it which the public can afford to give, and it is only by such governmental protection that the company are guaranteed their profits; for others would embark in the same manufacture as soon as they found it becoming profitable, and requiring no further pioneering.

There is no difference, then, gentlemen, between a patentee and a copyrighter, so far as the law is concerned, nor is there any so far as brains are concerned. If brains be the password to professional societies, and copyrighters are to be privileged above patentees on the standard of brains, then I for one would prefer to be outside.

But if the professions are above recognizing the ingenuity of men who are stamped as patentees, we have the assurance that the public have some regard for them when dead, if not while living. Side by side in Westminster Abbey you will find as many marks of remembrance to inventors as to authors and statesmen. No grander monuments are there than those to Watt and to George Stephenson. In this country we have dotting the land as many statues of inventors as of the literati and others. Witness those of Morse and Howe on the same ground with that of Daniel Webster. I am proud to be called a patentee.

If patents and patentees in the profession are so obnoxious, why do gentlemen all over the land make use of articles that are patented? It is evidence of the value of such articles, or they certainly would not use them exclusively. If the copyright system is just to an author, why not a patent to the inventor of the printing-press; of type and of type-making machinery, without which the manuscript of an author would not be worth the parchment upon which it is written?

Gentlemen, we are mutually dependent beings; we must recognize those laws which the combined wisdom of the ages has established. We cannot make professional men so supreme that they shall be a law unto themselves. No ethical law they may form has any value except it be based upon the eternal law of justice and equity.

The man who would attempt to dignify the brain-work of an author over the brain-work of a skilled mechanic, had better stop and consider who has done the most to elevate mankind,—those who labor and toil with their hands, or those who tell us what we should do, but construct nothing by which we are to do it. All laws are unjust that bind not equally upon all subjects, and professionals are not exceptions to the rule; the patentee has the same right and should have the same standing as the copyright author. As I intimated before, nothing has so stimulated authors and caused them to multiply books on every subject as the inventions which afford them the facilities for multiplying their works.

Let gentlemen who belong to a so-called profession beware how they trespass upon the rights of a patentee in their ranks.

What is our calling to-day but a trade? How much could we do were we deprived of the many special instruments lately devised? Three times the amount of *work*—I say work, although, in our bills, we call it professional services—can be performed in a day without exhaustion, as by the old processes; and far better, and, withal, much cheaper to the patient. If, then, machinery does so much for us, ought we to be so illiberal as to seek to deprive its inventors of their just remuneration?

I admit that grievous monopolies are sometimes based on patents, but what if we had perfect freedom to make and use any article that is newly invented? See how it would work. No one would put up expensive machinery and put forth capital and energy to give to the world a good thing at such a risk.

In conclusion, then, let me say, be consistent, and, if you persist in the destruction of patents, be honorable enough not to use the products of the brains and labor of the patentee, which you do not admit are of enough value to entitle him to a place with the holder of a copyright.

Dr. T. C. Stellwagen. Copyrights, I claim, do not come under the same rule as mechanical patents. A man who reads a book is not prevented from using the idea as often as he pleases, but what man who sees a patent can adopt the idea even? There is a wider difference between a copyright and patent right than anybody here appears to have recognized in this very fact.

Dr. Geo. T. Barker. No one is more fond of sentiment than myself, but I recognize that we should have common-sense reasons for our statements upon this subject, and not deal in glittering generalities. No one has a right to say that a man shall not receive remuneration for a product of mental labor, unless he can give some very good reason for it. I do not admit any difference between a copyright and a patent right, except in the remuneration; the same principle underlies both. I claim that no dentist has a right to take a patent except for the purpose of insuring his title to public recognition as the inventor of the appliance. If I to-day had the power to invent any useful contrivance, I would take a patent upon it, and to-morrow present it to the profession. We, as a profession, are not careful enough to protect those men who have presented us with useful inventions. I could name men, who are now dead, who have left families in poverty from this very cause. Now, Mr. President, I desire to make this point: that though a man has a right to obtain a patent upon a chair, for instance, or other appliance, he has no right to hold a patent that involves life, perhaps,—certainly the health and comfort of the human family. At the same time I recognize that credit is due to the inventor. Let us give him that which is prized most highly in this world, the due measure of honor for what he has done. I know that this will be a hardship in individual cases, but no general law can be passed that does not impose a hardship upon some one.

Dr. J. H. McQuillen. I recognize that there are two sides to this question. While the medical profession, as a profession, is in favor of what is known as medical ethics, in opposition to the taking out of patents, yet there are men eminent in the profession who do not accept that view. I might mention the names of some gentlemen who hold the position that a man has a right to take out a patent. I, for one, cannot recognize the distinction between a patent right and a copyright. There is, however, a distinction, so far as the obtaining of a copyright and a patent right is concerned. To obtain a patent right you must apply to the patent-office; your application must be subjected to the most rigid scrutiny to ascertain whether you have the original claim or not. If your right is perfect you obtain your patent. The man who presents a claim for a copyright is not compelled to submit his manuscript to a board of censors. He applies for his copyright and he obtains it. I am not an inventor, and I never expect to invent anything, but I am in favor of granting to a man who has spent time and money in elaborating an idea a right to take out a patent.

(To be continued.)

LEBANON VALLEY DENTAL ASSOCIATION.

The fourth annual meeting of the Lebanon Valley Dental Association was held at Lebanon, May 21st, 1878, the president, Dr. Mease, in the chair. The Code of Ethics of the American Dental Association was adopted, and was ordered to be printed on heavy card-paper, and to be hung in the office of each member of the association.

The following were elected officers for the ensuing year:

President.—Dr. W. H. Scholl.

Vice-President.—Dr. John A. Mayer.

Recording Secretary.—Dr. C. V. Kratzer.

Corresponding Secretary.—Dr. P. K. Filbert.

Treasurer.—Dr. John L. Ritter.

Executive Committee.—Drs. J. H. Mease, E. P. Kremer, C. B. Wagner.

Delegates to the State Society.—Drs. John L. Ritter, Eli Slegel.

Alternates.—Drs. John A. Mayer, C. V. Kratzer.

Delegates to the American Dental Association.—Drs. W. H. Scholl, J. H. Mease.

Adjourned to meet at Reading, November 19th, 1878.

P. K. Filbert, *Secretary.*

SIXTH DISTRICT DENTAL SOCIETY.

The ninth annual meeting of the Sixth District Dental Society of the State of New York was held in the Common Council chamber, Binghamton, on the 1st of May, 1878.

The following officers were elected for the ensuing year:

President.—Dr. F. M. Snook, Waverly.

Vice-President.—Dr. G. W. Hoysradt, Ithaca.

Recording Secretary.—Dr. G. H. Smith, McGrawville.

Corresponding Secretary.—Dr. L. E. Ireland, Oneonta.

Treasurer.—Dr. S. H. McCall, Binghamton.

Censor.—Dr. H. Hodge, Binghamton.

G. H. Smith, *Secretary.*

AMERICAN MICROSCOPICAL SOCIETY.

At the annual meeting of the American Microscopical Society of the City of New York, held Tuesday evening, March 26th, 1878, the following officers were elected for the ensuing year:

President.—John B. Rich, M.D., 1 West Thirty-eighth Street, New York.

Vice-President.—Wm. H. Atkinson, M.D., 41 East Ninth Street, New York.

Secretary.—O. G. Mason, Bellevue Hospital, New York.

Treasurer.—T. D'Orémieulx, 7 Winthrop Place, New York.

Curator.—John Frey, Bellevue Hospital, New York.

O. G. Mason, *Secretary.*

AMERICAN DENTAL ASSOCIATION.

The eighteenth annual session of the American Dental Association will be held at Niagara, Tuesday, August 6th, 1878, and continue in session four days.

Marshall H. Webb, *Corresponding Secretary.*

SOUTHERN DENTAL ASSOCIATION.

The tenth annual meeting of the Southern Dental Association will be held at Niagara Falls, commencing on Tuesday, August 6th, 1878.

The change of place of meeting from Atlanta, Ga., to Niagara Falls has been deemed advisable for the purpose of joining the American Dental Association and the American Dental Convention, which meet at the same time and place, when an effort will be made to organize an American Dental Congress, or some sort of a truly national organization. Committees of conference have been appointed from the three societies for this purpose.

These facts may enhance the interest and secure a larger attendance. An unusually interesting meeting may be expected. The profession is invited.

E. S. CHISHOLM, *Secretary*,
Tuscaloosa, Ala.

AMERICAN DENTAL CONVENTION.

THE twenty-third annual meeting of the American Dental Convention will be held at Niagara, commencing Tuesday, August 6th, 1878.

GEORGIA STATE DENTAL SOCIETY.

THE tenth annual meeting of the Georgia State Dental Society will be held in Atlanta, commencing Monday, July 29th, 1878, at 10 A.M.

M. S. JOBSON, *Cor. Sec.*

PENNSYLVANIA STATE DENTAL SOCIETY.

THE executive committee take pleasure in announcing the following programme for the meeting of this society at Bedford Springs, July 30th:

ESSAYS.

"Thirty Years' Experience with Anæsthetics," by S. Welchens, D.D.S.; "A Review of the Conservative Treatment of the Dental Pulp," by Louis Jack, D.D.S.; "Ante- and Post-Professional Education," by H. Gerhart, D.D.S.; "The Accepted Creed," by Prof. C. N. Peirce, D.D.S.; "Gold and Tin in Combination," by Prof. D. D. Smith, D.D.S; "Artificial Crowns," by Prof. E. T. Darby, D.D.S.; "Why do Fillings Fail? The Electro-Chemical Theory of the 'New Departure' *vs.* Defective Manipulation and Defective Structure," by W. H. Trueman, D.D.S.; "Fissures," by Marshall H. Webb, D.D.S.; "Discoloration of the Teeth," by G. W. Adams, D.D.S.; subject to be announced, by R. Huey, D.D.S.; Address of the Retiring President, by C. S. Beck, D.D.S.

SURGICAL CLINICS.

A tumor of the inferior maxilla, extending from the first molar on the left side to the first bicuspid on the right side, will be removed by Prof. Chas. J. Essig, M.D., D.D.S.

OPERATIVE CLINICS.

Cohesive gold impacted against and over frail walls of enamel, so that such walls may be encased and protected by gold, and restoration of the contour of missing tissue by the aid of a new electro-magnetic mallet, by Marshall H. Webb, D.D.S.; the use of cylinders, illustrated by Robert Huey, D.D.S.; restoration of contour by the aid of the electro-magnetic mallet, by Geo. B. McDonald, D.D.S.; operation with the electro-magnetic mallet, by E. P. Kremer, D.D.S.; operation, by H. C. Longnecker, D.D.S.

Excursion tickets can be procured in New York, Baltimore, Washington, and in all the cities of this State; also at all the principal stations of the Philadelphia and Erie, the Northern Central, and Pennsylvania Railroads. Persons desiring to go from Bedford to the American Dental Association can purchase their tickets for Niagara Falls *via* Harrisburg or Tyrone, and at these points purchase Bedford excursion tickets, and as they return to these points resume their journey on their Niagara Falls tickets. The hotel rates to persons attending the association have been reduced to two dollars per day. All dentists are invited to be present.

G. W. Klump, *Ch. Exec. Com.*

CENTRAL PENNSYLVANIA DENTAL ASSOCIATION.

The fifth annual meeting of the Central Pennsylvania Dental Association will be held at Tyrone, Pennsylvania, July 17th and 18th, 1878. John S. McKiernan, *Secretary.*

BIBLIOGRAPHICAL.

The Vest-Pocket Anatomist. By C. Henri Leonard, A.M., M.D. Second enlarged edition. Detroit, 1878.

A memorandum-book of anatomy, giving name, pronunciation, etc., of each bone, muscle, artery, vein, and nerve. A convenient memory refresher.

The Multum in Parvo Reference and Dose Book. Second edition. By same author.

It contains a great deal of valuable information systematically arranged.

OBITUARY.

DR. HARRISON L. HILTNER.

Died, at Bluffs, Illinois, May 15th, 1878, of consumption, Dr. Harrison L. Hiltner, in the twenty-third year of his age.

Dr. H. was a graduate of Philadelphia Dental College, class of 1877, and until within a few weeks was in active practice in Philadelphia. At the time of his death he was on his way to Colorado, hoping to receive some benefit from the milder climate of that region.

At a meeting of the resident members of the class of '77 of the Philadelphia Dental College, held on May 25th, at the office of Dr.

Jos. R. C. Ward, president of the class, to take action on the death of Dr. Hiltner, a committee was appointed, and appropriate resolutions were offered and adopted expressive of the high esteem in which Dr. Hiltner was held; of regret for his death, and of sympathy with his family.

DR. JOHN W. LITTLE.

Dr. John W. Little, of Concord, N. H., who was born in Salisbury, in said State, April 7th, 1818; a graduate from Dartmouth Medical College in 1845; received the degree of D.D.S. from the Philadelphia Dental College a few years after; was one of the original members of the first dental society of New Hampshire, organized in 1853; one of the first members of the "Merrimack Valley Dental Association," and a charter member of the "New Hampshire Dental Society," and one of their Board of Censors, died of paralysis at his home about December 21st, 1877.

At a meeting of the Merrimack Valley Dental Association, held May 16th, 1878, the death of Dr. Little was announced, and resolutions passed expressive of the high estimation in which Dr. Little was held as a practitioner; of his faithfulness as a member of the society, and of his truth as a man; of regret at his death, and of sympathy with his family.

PERISCOPE.

The Degeneration of Human Teeth.—We have often been surprised that the causes which have led to the present degeneration of human teeth have not attracted the serious attention of dentists, and other members of the medical profession. It may be that the former class of practitioners are so occupied with meeting the demands made upon them for the extraction of decayed and the insertion of artificial teeth, as to have little time for inquiring into the subject. Now, however, that the majority of dentists are well educated men, and are well qualified to turn their attention to something more than the mere mechanical departments of their profession, it is to be hoped that some advancement will be made in our knowledge of the causes and true pathology of a disease from the ravages of which there is scarcely a family in the kingdom exempt. What these ravages are, and the alarming extent to which they have reached, are so generally known that any particular reference to them is unnecessary. They have indeed become so common, that our very familiarity with them has made us indifferent to the fact and the evils that may result from it. This premature decay of teeth is not confined to any one class, for the rich and the poor appear to suffer alike. Youths who have not yet stepped into manhood with half their teeth nearly gone, and girls scarcely out of their teens applying to the dentist for a new set! Nor is this general prevalence of dental caries confined to this country. The Americans, and most of the Continental nations, are not more fortunate than ourselves. A distinguished dentist in Philadelphia remarks that "from the great-grandparents to their children, and their children's children, there is a general continuous deterioration in the quality of their teeth through the successive generations. All the facts of professional experience which have been gathered, all the improved modes of practice which the best heads and hearts have thus far developed, have not sufficed to stem the tide which seems destined to render the human race edentulous."

"Surely," says Mr. Carter in the current number of the *British Journal of Dental Science*, "some law of God and nature has been outraged to bring upon our children so dire an affliction." Unfortunately, this decay of teeth is only part of the evil we have to contend with, for independently of the disfigurement, and other inconveniences resulting from it, we have to take into consideration its injurious effects upon the digestion and assimilation of food, and consequently upon the general health of the individual.

To what causes, then, are we to attribute this general degeneration of the teeth among civilized nations? As no one has taken the trouble to seriously inquire into these causes, we must not wonder that a number of hypotheses have been hastily advanced in explanation of one of the most remarkable features in the *physique* of a large portion of mankind. It has often been asserted that the large amount of sugar now eaten by the public, compared with what was consumed by our ancestors, has much to do with the evil of which we are speaking. It is doubtful, however, whether this practice does anything more than accelerate the progress of the caries that has originated in other ways. Neither are people who take much sugar particularly subject to, nor those who take little or none particularly exempt from, this affection; and it is well known that no people have better teeth than the negroes at work in the sugar plantations, who consume a large amount of this substance. Nor can we conceive that nature would have made sugar an important ingredient of the nourishment she has provided for the new-born infant, if she did not intend it to be always an essential article of food for the future man. A more rational argument is that which refers the degenerating condition of human teeth to those injurious influences which are at work in all our great centers of population, such as overcrowding, impure air, insufficient food, etc. But this explanation is by no means a satisfactory one, for the disease is just as rampant among the middle and wealthier classes, who are little exposed to these conditions, as among the most destitute section of the community, and as prevalent in the village as in the city slums.

No people, remarks the writer above mentioned, live in more crowded and unwholesome cities than the Chinese. They spend their lives in conditions the most repugnant to health, without drainage or ventilation, feeding, in many instances, upon the most obscene food, giving rise to leprosy, gangrene, necrosis, ophthalmia, and terrible forms of skin diseases, and yet their teeth remain good. On the other hand, the rural populations of Germany and France now suffer to such an extent that a sound set of teeth is a rarity among them; and almost the same may be said of our own farmers and their families. Indeed, Dr. James A. Salter, the eminent dental pathologist, states that in this country the laboring classes in purely agricultural districts are afflicted with caries of their teeth beyond all others.

Nor can this great and growing evil be traced to the prevalence of any particular disease, or class of diseases; although there are several constitutional affections, the operations of which should not be lost sight of in discussing this subject. Among the local and constitutional diseases, says Mr. Sewill, which favor the onset and progress of caries, "may be mentioned all the varieties of stomatitis among the former, and among the latter, scrofula, syphilis, phthisis, chlorosis, and chronic alcoholism." But the great question before us is not whether a few cases of dental caries may not be traced to the baneful influence of one or other of those affections, but whether they are accountable for the enormous number of cases that are constantly coming under the notice of the dentist or general practitioner. If this were really the case, then it follows that the general health of the community must be in a very deplorable state. If every one who runs to the dentist with half his teeth gone, or fast going, is to be considered as the victim of some of those constitutional maladies to which dental caries has been attributed, then must we admit that we have all along been laboring under a delusion with respect to the reputed improvement in the health of the public, and that these maladies are fast undermining the constitution of all classes of society.

Fortunately for the future prospects of the next generation, we cannot accept this argument either; for it is well known that all these constitutional affections are most prevalent in crowded cities and among the poor, whereas the disease now under consideration is just as rife in the country as it is in the town, and among the rich as among the poor. Besides, in a large proportion of cases, caries of the teeth cannot be traced to the existence of any constitutional disorder whatever.

But the most remarkable and significant fact in connection with this question is, that the improvement in the general health of the public, and the degeneration of their teeth, seem to have advanced in an inverse ratio. The most eminent authorities in hygiene and sanitary statistics agree that a very great improvement has, within the last fifty years, taken place in the sanitary condition of the people. The general mortality or death-rate has diminished to a considerable extent; disease is neither so prevalent nor so fatal as it was formerly; the average duration of human life has been remarkably increased. We live more by rule, drink purer water, breathe purer air, and are less exposed to the ravages of epidemic disease than our ancestors were; and yet, *pari passu*, with all this improvement in the health and average longevity of the public, we find that the degeneration of their teeth has been steadily increasing, and to such an extent as to suggest the propriety of making a systematic investigation into the causes which have led to it.—*Editorial in Medical Press.*

An American's View of the German Situation.—Under the title, "American Degrees in Europe," C. M. Wright, D.D.S., has published in one of the dental journals an article which is so full of errors and partialities that it quite defeats its own purpose, *satiram non scribere.* It would not, indeed, be at all worth the trouble of giving heed to the effusion, did we not hold it a duty to afford our contemporaries on the other side of the water some idea of the silliness of such an attempt at deliberate insult.

We here in Germany can, without any envy, recognize that in the territory of dental art—Zahnheilkunde und Technik—the American is to be esteemed as the example. In Germany our universities furnish no opportunities for mechanical instruction, neither is any attention given by them to the art of operative dentistry; there is nothing of the opportunities offered by the clinical system of American dental colleges. It is also to be recognized that no people have such bad teeth as the Americans; consequently, nowhere is there such demand for the dentist. This difference in demand for services may explain the little importance to the German of any such special degree as that of the American D.D.S. The infrequency of titled dentists arises, therefore, out of the absence of any special degree in our country, and in the further fact that a D.D.S. is to be acquired only by going into a land where such title has been legalized. In Germany the doctorate is a university grade; here only exists a right to make such a title. Our author in his nonsensical paper assumes to know that titles are purchasable in Germany, and at the same time professes to set little store by a German state examination. Our possessor of the D.D.S. is evidently a man of prodigious powers of observation. Out of the opportunities afforded by "a very short residence upon the Continent," he affects to know of the incompetency of a thoroughly drilled medical man to understand as much as he who has confined his scientific studies to the covers of a few of the books which a German student is compelled to master. D.D.S.—poor overworked possessor of a stupendous degree!—goes on to inform his American brethren that "in every little state of the Continent twofold more doctors are made than in any State of America. "These little states make," he says, "doctors of laws at three-and-twenty years of age, doctors of philosophy at five-and-twenty, doctors of philology at an age when there is found no use for a razor; in short, doctors of all possible kinds, saving those of the dental art,—zahnheilkunde. The Directory," says our author, "is full of Herren Dr. and Frau Dr., and as to the title 'Herr Professor,' that is wonderfully common. A banker is often enough Herr Dr., a chief of police is Dr. Phil. or Dr. Jur. Advocates are Dr., and so forth. The ridiculousness of the American title of captain disappears entirely in this land of titles." So thinks the critic.

We do not know upon what grounds our Herr D.D.S. has felt himself competent to utter such judgments after his "very short residence." Yet possibly he is in the right. Doctors are assuredly more plentiful with us than with the Americans, yet we believe it is acknowledged alike by friends and enemies that the possession of a doctorate in Germany means that the possessor is an educated person. It would assuredly seem, then, to be a matter of credit to "a little state" that it is able to name so many doctors. It may not be amiss, however, to state that, for ourselves, we learn first through our visitor of "a very short residence" that such a title as Doctor of Philology exists in the fatherland. That the degree of Herr Professor is so wonderfully common was something which as well was quite unknown to us. The title Professor is applied by many people to the gymnasium teachers; in Prussia and certain other German states it is used as a synonym of the English word teacher. The law allows it, however, only to an instructor at the university. We understand that in America the people call all dentists Doctor. It is not at all clear to us, however, where our close observer was able to get sight of this wonderful number of "Herr Professor Dr." That in our directory was as well to be found the address of so many "Frau Dr.," with its necessary confusion to our D.D.S., drops into our benighted mind a conviction that during the "very short residence" the Zahnarzt—dentist—failed to get comprehension of at least one of our mannerisms. In Germany the wife shares the title of her husband. Finally, we find it not at all wonderful, this matter of extensive educational acquirements by bankers and police magistrates. Query. Would (say a mere trifle of additional) education interfere with the usefulness of magistrates over the water? In Germany it is to the honor of many bankers that more store is set by them on knowledge than on money.

Not satisfied with his bold dash, our American friend attempts a picture of the German student. "*The student*," he says, "becomes known as a student after the examination, and now in his own opinion and in the eyes of the shop-keeper, as well as of American visitors, he is a wonderful and peculiarly God-favored individual. With such a reputation, when he sits in the beer-brewery with his long pipe, little cap, long boots, and laced coat, and with his great bright-eyed Danish bull-dog, he is a picture indeed. The big glassful of brown beer affords the required support to his philosophy. He is proud of the scars on his nose and cheeks which have come of his duels,—not always, however,—and he is proud, too, of his beer-swilling capacity; he banters his neighbors on the number of emptied glasses. Damned be he who first cries 'Hold! enough!'—that is his motto."

This is a picture as silly as it is sorry. We are not able to make ourselves believe that the maker of it has come to any greater wisdom than have our three-and-twenty-year doctors. We might, in passing, suggest to our Herr D.D.S. the propriety of sending his antediluvian drawing to Herr A. Welmer, to be used in his "History of Students."

The doubt of our American savant as to the ability for practice of the graduate in medicine from a German university compared with one prepared by "one of our respectable schools" may be left with him. The fact is that no one, except, indeed, this full-learned D.D.S., is in the habit of considering his studies finished when he leaves the Alma Mater. The habit with us is to esteem the object of a university education to be the preparation of the individual for special studies, which, in the case of the doctorate, it is the office of the hospital wards to furnish. Out of practice and opportunities for observation come proficiency, and whether these advantages are met with in America or in Germany makes, we infer, little difference.

As regards which is the better system of education, that of America or that of Germany, we think a conclusion as to the matter might reasonably be allowed to rest with this Herr D.D.S. as an illustrative example. France has recognized that there is meaning in the German schoolmasters. The meaning of education in Germany lies in that which is resultant of experience. Old countries move not so rapidly as do the new. Before moves are made by experienced people they are apt to be considered from more than one side. America has moved to the making of dental colleges; she is flooding the land with jewelers whom she deceives herself in designating doctors. She seems already to be discovering that there is something wrong.—*Abstract from Correspondenz-Blatt für Zahnarzte, by A. B. C.*

On Ranula in New-Born Children.—In a paper read before the Moscow Medical Society and published in the *Moscow Medical Gazette* (abstract in *Central-Zeitung für Kinderheilkunde*, November 1st), Dr. N. Müller makes some observations on the occurrence of ranula in the newly born. The affection is so rare that its existence has been denied. Four cases have been recorded by Dubois, Bertin, Lombard, and Bland, and four others by Bryant. In the foundling hospital at Moscow, four or five cases of congenital ranula have been observed during the last seven years in about eighty thousand children. Of these, Dr. Müller describes three. In a boy seven days old, a ranula as large as a pigeon's egg was found lying to the left of the frænum linguæ; in a girl three weeks old the swelling lay on both sides of the frænum, and attained the size of a large walnut before the end of the second month; and in a boy three days old there was a pyriform ranula, with the small end directed forwards, lying to the left of the frænum. The last case was apparently one of retention-cyst from obstruction of the orifice of Wharton's duct. In the first two cases the tongue was pushed upwards, and sucking was impeded. Puncture with a needle gave exit to a clear sero-mucous or (in the third case) watery discharge; the swelling then collapsed, but in a few days regained its original size. In the first case, tincture of iodine was injected; this produced suppuration, followed by cure of the ranula in three weeks. In the third case, the sac of the tumor, after having refilled, was cut away with scissors, with a successful result. In the second case incision was avoided, on account of the vascularity of the swelling, but a ligature was applied over it. The swelling did not disappear, but only became smaller. At the end of a fortnight, no change having taken place in the size of the swelling, and there being scarcely any discharge from the punctured points, the ligature was removed. The ranula was still as large as a pigeon's egg, hard, and without fluctuation. An attempt to remove the contents by means of Pravaz's syringe was unsuccessful, as was also painting with tincture of iodine. Towards the end of the fourth month the child died of chronic enteritis. At the post-mortem examination there was found a cavernous cystic tumor as large as a pigeon's egg, the cavities of which were filled with a clear transparent fluid. The sublingual salivary glands were normal.—*London Medical Record.*

Fracture of the Lower Jaw in an Infant.—August 3d, 1876.—Williams, a boy aged three years, fell from the third-story window of the house in which he lived to the street, a distance of about thirty feet. I saw him an hour afterwards. He was then insensible, suffering from concussion, etc. Upon examination I found a simple fracture of the inferior maxilla through the middle of the horizontal ramus of the right side. Other than this there was not a scratch or bruise upon him. No dressing was applied until the next day, when he had in a great measure recovered from the shock. There was not much displacement of the bones. To prevent his interfering with the dressings I applied adhesive strips to the jaw in the shape of a Boston bandage. This fixed the jaw firm and immovable. Everything did well until—

August 29th, when he fell down a flight of stairs and refractured his jaw. The end of the *anterior* fragment of the bone was driven through the integument of the cheek and overlapped the front of the posterior fragment of the bone about half an inch. After some difficulty the ends of the bone were brought in apposition, but could not be retained by any external appliance.

After anæsthesia by ether, I dissected the inside of the cheek from the ends of the bone, bored a hole through each end with a brad-awl, passed a stout silver wire suture through, and twisted it tight. This brought the ends of the bone in perfect apposition, and held them securely. The ends of the wire were brought out through the external wound; this served to facilitate free drainage, as well as the final removal of the suture. After three weeks the fracture was finally united, and two weeks later the suture came away, after which the external wound soon healed. The teeth are level and the articulation perfect. With the exception of some flattening of that side of the face there is no deformity.—*George A. Mursick, M.D., in Buffalo Medical and Surgical Journal.*

SULPHUROUS ACID IN THE TREATMENT OF ABSCESSES.—At a recent meeting of the Clinical Society of London, Mr. Osman Vincent described a method by which he had opened eighteen lumbar abscesses without a fatal result. The abscess was first opened and then injected with a solution of equal parts of sulphurous acid and water, after which a poultice was put on. Next day the injection was renewed and some tenax applied. The treatment went on till the cavity healed up. The injection sometimes gave pain. Sometimes the fluid returned clear, and at other times black. When sulphurous acid was injected, it acted upon the pyogenic membrane, and then pus did not reform.—*Medical and Surgical Reporter.*

TIC-DOULOUREUX.—A patient who for several years had suffered from an intense neuralgia facialis came under the treatment of Prof. Peters, of Paris, who put him under a treatment of six grains of bromide of potassium, the dose repeated thrice daily for the first month, four grains thrice daily in the second month, two grains thrice daily in the third month. The result is reported as being astonishing.

Great success is claimed by Prof. Gubler in the use of aconitum napellus for the ordinary form of facial neuralgia, particularly when congestion is present.

Prof. Lee, of the "Hôtel Dieu," Paris, relates a case where a patient of his, after thirty years of suffering from the tic-douloureux, got quickly rid of his pain after a few daily administrations of eight-grain doses of salicylate of soda.—*Correspondenz Blatt.* A. B. C.

ARSENIC IN VULCANIZED RUBBER.—A German chemist has found arsenic in vulcanite supposed to be an impurity in the sulphur used for vulcanizing caoutchouc. May not this unsuspected enemy be a cause of some of the sore mouths, the result of wearing these rubber plates? The chemist rarely finds anything save the thing he is looking for; and as the efforts have all been in the direction of search after free mercury, etc., would it not be well to investigate the arsenic question?—*Louisville Medical News.*

Saliva-Pump.—M. Claude Rogers invites the attention of the profession to a saliva-pump of his invention, constructed on the principle of the siphon. The apparatus is composed of a straight metal tube surrounded several centimeters above the lower end by a diaphragm, and having an opening immediately above this diaphragm; the continuation of the metallic portion is a bent glass pipe and an india-rubber tube. In using the apparatus, the free end of the glass tube is placed in the mouth, while the metal end is connected with the discharge-pipe of the office spittoon. The spittoon being now supplied with a continuous stream of water, a current is made to flow from the little hole above the diaphragm, which determines a partial vacuum in the upper part of the tube, the result of which is the sucking into the glass pipe of the saliva. The quantity of water required to keep up this vacuum is not at all considerable, nine litres an hour being sufficient. A modification of this instrument is described by M. Charles Tomes. A rectilinear metal tube passes along one of the feet of the operating chair,—merely a second horizontal one,—which traverses the floor, being connected with a reservoir situated at some convenient distance. At the junction of these tubes a slight opening is so arranged that a draught is constantly maintained in the one associated with the mouth, by reason of the flow towards and from the opening at the junction of the water from the cistern. About four litres of water preserves to the pump full activity for an hour.—*Abstract from Le Progrès Dentaire, by A. B. C.*

HINTS AND QUERIES.

"He that questioneth much shall learn much."—Bacon.

Correspondents desiring a reply in this department are requested to make use of *distinctive signatures or initials*, and avoid the practice of signing their communications Reader, Subscriber, etc.

Correspondents who wish notice to be taken of their communications should authenticate them with their names. We cannot insert queries or replies except they are so accompanied. Names not necessarily for publication.

Will some one who understands the "electro-chemical theory," on which the "New Departure" is based, please answer the following questions:

1. Does the supposed galvanic action take place between the gold and enamel, or the gold and dentine? In other words, do enamel and dentine hold the same electric relation to a gold filling?

2. Is the electric action excited by the ordinary fluids of the mouth as they usually exist, or does it only take place when a filling "leaks," and the fluids become stagnant, decomposed, or vitiated?

3. If it only takes place when a filling "leaks,"—*i.e.*, when and where a filling is imperfect or defective,—what reason have we to suspect that the destruction around the filling differs in its cause from that which caused the original cavity?

4. When a layer of tin foil is used, how long may we expect the alkaline or passive condition to last? How long will the tin last, and what finally becomes of it—the space it occupied—and the elements set free from the compounds decomposed by the oxygen, leaving them to unite with the tin?

5. If the action is excited by the fluids of the mouth in their usual condition,

and is between the enamel and the gold, or when the enamel has been removed by filing, between the dentine and the gold, how is it that the more accurate we make a gold filling (provided we do not harm or injure the tooth-tissue) the more likely it is to accomplish its work, and that gold fillings fail most when we are least able to make them accurate?

A diligent study of the various papers and reported discussions on the "New Departure" having failed to throw light upon these points, any information will be appreciated by W. H. T.

WILL some one be kind enough to explain why a plate with a cavity is required to fit tighter than one without a cavity? I am unable to see the philosophy of it.—B. T. E.

THE writer, a young practitioner, is desirous of obtaining reliable teaching in regard to the treatment of congested and spongy gum. Such cases are under my eye in a country practice nearly every day, and I have not met with much success in the treatment of them. Will not some one give causes, character, and treatment, and especially the why for the treatment?—S. T. R.

CROWDED DENTURES.—Information is requested regarding the desirability of extracting certain teeth in perfectly healthy dentures in order to relieve approximate or lateral pressure. Does such pressure certainly tend to the production of caries?—DENTOS.

WILL not some one of experience in medical practice as well as in dentistry write upon dentition as affecting the health of infants?—H. V.

ABOUT one week after the extraction of a first superior molar for a patient my attention was called to a growth in the socket resembling "proud flesh." It was not tender to the touch. I have tried to remove it by applications of nitrate of silver and carbolic acid, but a month under treatment has not accomplished a cure. What is it, and what treatment is indicated?—B. F. S.

WILL some one please inform me of the theory on which a foreign body may become united to a living one, as in the replantation of a tooth?—I. N. B.

WILL the editor of the DENTAL COSMOS oblige by informing the profession who was the first to suggest the use of screw-pressure in correcting irregularities of the teeth?—B.

The first, so far as we know, to suggest the employment of screws in regulating apparatus was Charles Gaine, M.R.C.S., of Bath, England. This gentleman, who is still living and residing in Bath, claims to have originated the idea in 1849. He published, some twenty-two years ago, a pamphlet entitled "On Certain Irregularities of the Teeth: with Cases illustrative of a Novel Method of Successful Treatment." In this little work the following paragraph occurs: "I now have recourse to the following method: a gold plate extends back to and embraces firmly the first molars. To this support a thick, flat piece of gold is attached, and carried around the front part of the dental circle, so as to cover all the anterior surface of the incisors, leaving only the cutting edges free. This accomplished, I cut away the plate from the posterior surface of the irregular teeth, and opposite to these vacant parts drill holes in front through the thick gold, into which a screw is inserted for each tooth to be operated upon. The action of this pressure on the faulty teeth is direct, painless, and most easily controllable. For its efficacy I can fairly vouch. A fortnight suffices to bring the teeth into a true form."—EDITOR DENTAL COSMOS.

REPLY TO A. R. REED, who asks how to keep the moisture out of a cavity situated on the labial surface of a superior central incisor. Make but one hole in the rubber dam, care being taken that it be only sufficiently large to stretch over the tooth; draw the dam well up about the neck of the tooth, then grasp the dam above the cavity with the thumb and forefinger of the left hand, and draw it up until the cavity and margin of the gum are exposed to view. The dam must be kept taut and firmly pressed against the gum during the operation of filling.—C. H. GILBERT.

REPLY TO A. R. REED, who asks how to keep the moisture from cavities (under the gum) situated on the labial surfaces of centrals. The manner in which I have been most successful, is to take thin dam, making a small hole, and adjusting in the usual manner; then take a large hatchet excavator in left hand, and with its sharp edge force the margin of the dam under the gum, until you have passed over the cavity; then, holding the instrument's edge firmly against the neck of the tooth, bring the instrument's curve horizontally from the tooth.

Now you have the gum and dam forced above the cavity, with your instrument as a prop, while with your right hand you can prepare, fill, and finish. In difficult cases, slitting the gum may be advantageous.—C. M. SHARP, D.D.S.

ANSWER TO M. B., in May DENTAL COSMOS.—Invest your teeth in plaster as hard as your model is made of, and be sure not to have any air-bubbles under the ends of the teeth. Bring your heat up to 235° before starting your flask together, and then use slow and gentle pressure instead of turning your wrench with a jerk, and you will not be annoyed by teeth being driven into the plaster investment, thereby destroying the proper articulation. I would add that the gates for the excess of celluloid should always have a greater capacity by one-half than we estimate the surplus at, as the celluloid should never be allowed to reach, or come out between the flasks, as it soon burns, thereby endangering the quality of the plate inside the flask, besides retarding the process of bringing the flasks together.—GEO. B. McDONALD.

REPLY to M. B.—Breaking blocks and disarticulating teeth—two of the greatest troubles in the use of celluloid—may be entirely avoided by the following method. After preparing the case ready to flask, remove the teeth from the pattern; stop the pin-holes, then remove the pattern and carefully flask it. When the mould is ready, remove all the wax or material of the pattern; place the celluloid "blank;" apply heat, and cast the same as if for final case. Remove the flask from the heater; place it in the clamp and cool rapidly. When it is entirely cool remove it from the flask, and trim as carefully as for final case until the blank is almost the same as the pattern in thickness (it always comes out thicker). Now you have a blank with but little excess; only what the vacuum and pins displace, or slightly more, and exactly the shape of the pattern, minus the teeth. Now set up the case again, being careful to make the pattern the same size; flask, and when ready remove the pattern; if doubtful as to amount of excess, pare the edges of the mould slightly, which will be all that is needed. Replace the blank; apply heat, when but moderate pressure will be found necessary to bring the flask entirely together. If dry heat is preferred, dip the edges of the blank to come in contact with the pins in spirit of camphor for a few minutes before casting. Dry heat is the best method, in the opinion of the writer.—S. E. H.

Reply to M. B.—Have your plaster thick and fill the flask full. When you put the flask in the bath invert it, and the cutting edges of the teeth will all be down, and no material will insinuate itself under them, nor will they be driven into the plaster. See *Dental Register* for February, 1878, and read the article on working celluloid by the writer.—J. B. Tullis, *Jefferson*, *Texas*.

Answer to I. L., in May Dental Cosmos.—The general rules and principles of practice to be observed in the treatment of Riggs's disease are, first, the selection of properly-formed instruments for the work; second, the thorough removal of every particle of calculus from the roots of every tooth, also the removal of all portions of necrosed alveolar process; thirdly, the washing of the tooth-sockets with elixir of vitriol, which is best accomplished by the use of Dr. Farrar's alveolar abscess syringe. The treatment is accomplished by carrying the point of the previously-loaded syringe to the bottom of the tooth-socket, and by a slight turn of the piston deposit a single drop of the agent employed. If the deposition is found to have reached three-fourths of the distance toward the apex of root, and we remove it only one-half the distance, we shall have a failure, no matter what therapeutical treatment we may institute after the operation.

The most prolific cause of failure in the treatment of Riggs's disease is a lack of thoroughness on the part of the dentist. As the treatment is painful to the patient, the dentist through pity stays his hand before the calculus is half removed. Thereby patient and operator are rewarded by a failure. The best instruments I have ever used for the removal of calculus around the roots of the teeth are those designed by Dr. Riggs.—G. B. McDonald.

A Rotating Appliance.—Having got the benefit of many a wrinkle from your pages, and being willing to reciprocate, I send you a description of a little appliance which has been of assistance to me in the ofttimes awkward operation of rotating teeth in their sockets.

The "dipper" wrench, made by fitting the tooth with platinum foil, and afterwards covering with solder, and the "box" wrench of Dr. Farrar, while both excellent, are, nevertheless, somewhat expensive, and sometimes difficult to apply, while this device can be made in five minutes, and at a nominal expense, and can be adjusted to any tooth. It may be old to others, but in my office it is a two-weeks infant, yet it promises great things.

Fig. 1.

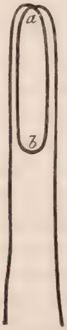


Fig. 2.

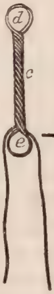
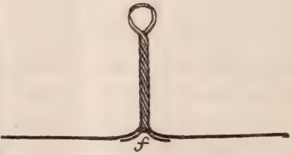


Fig. 3.



Take a piece of fine gold, silver, or platinum wire, five inches long, and bend it into a double loop, as shown in Fig. 1. Put the point of an excavator through at *a*, and, taking hold at *b* with thumb and finger, twist the four wires into a cable, *c*, Fig. 2, the excavator making the loop *d*. Now cut open the small loop *e*, and bend the ends back on the long ends as in Fig. 3, and place a bit of solder at *f*, holding it in the blaze until the short ends are soldered down so as to make a firm, rigid base for the lever *c*. Pass the long ends around the tooth to be rotated, and bring them back to the lingual surface of the tooth. Fasten securely by twisting together. You have a wrench which can be bent up close to the roof of the mouth, or at any desired angle, and will remain perfectly firm. Apply the rubber as usual.—W. E. HYDE.

IN repairing old rubber sets with celluloid, I have found that the great pressure used in bringing the flasks together will frequently loosen some of the other teeth on the plate. But I find that a little attention in removing a thin layer of plaster from over every tooth will obviate the trouble.—W.

NOTE ON MORPHIA.—In irritable teeth, where, after the destruction of the pulp, it is found difficult to make the organ retain even a temporary plug of cotton or of rubber, comparative, if not indeed profound, ease is to be secured by the free use about the canals of the root of dry sulphate of morphia. This salt thus applied seems to result in so prolonged a local narcotization that health is restored before chance occurs for re-excitation of the parts. As regards absorption of the agent into the system there would not seem to be anything to fear, for even should the possibility for such a process be present in any given case, the absorption would necessarily be a performance so tardy in character that the most susceptible of systems would find itself able to take care of the consequences. Gradual systemic absorption would show itself in gradual sick stomach.—A. B. C.

DURABILITY OF A GUTTA-PERCHA FILLING.—A gentleman of this city, a man of undoubted veracity, showed me to-day a tooth in his own mouth, filled with crude gutta-percha *by himself*, in England, thirty-five years ago. The tooth and filling are both good, and I think the filling will last ten years longer.

The gentleman referred to has resided here twenty-nine years, and can verify the fact of the tooth being filled six years before.

It is the left inferior cuspid, filled on the front and front approximal surface; the cavity is still full, and the filling apparently not much softened nor the tooth decayed about the filling. The tooth was decayed to the pulp. He says that he prepared a smooth end to a piece of hard wood for a plugger, warmed the gutta-percha, packed it very hard, a very small piece at a time, and full, cutting away the surplus subsequently with a sharp knife.—S. L. WARD, *Lowell, Mass.*

ALKALINE SALIVA FROM THE PAROTID GLANDS.—EDITOR DENTAL COSMOS,—A case of which there is none similar on record is as follows:

A young lady patient at the infirmary of the Harvard Dental School has alkaline saliva from the parotid glands, while from the ducts under the tongue the saliva is distinctly acid.

It has been said that the saliva from the sublingual and submaxillary glands was never acid. This case shows that it is not a universal rule.—H. F. HAMILTON.

NITRITE OF AMYL IN ASPHYXIA.—The administration of nitrite of amyl by inhalation in cases of asphyxia and syncope has been suggested on account of its powerful stimulant action on the heart. I have experimented personally with this agent, and observed its effects upon others, and am convinced that it will prove a valuable remedy in all forms of suspended respiration. In asphyxia resulting fron the inhalation of chloroform, ether, or nitrous oxide gas, from choke-damp, smoke, or mephitic exhalations, its use seems to be indicated. In cases of apparent death from drowning, I anticipate that it will prove a valuable auxiliary in efforts to resuscitate. When it is not possible to administer this agent by inhalation, I suggest that it be conveyed to the stomach by the tube, or used hypodermically.—F. F. GAGE, D.D.S.

A SUGGESTION.—An editorial remark in the May number of the DENTAL COSMOS, "that a hiatus exists between the qualifications of dentists and physicians; and that the institutions that have given the respective qualifications have equally failed to bridge the chasm," affords me an excuse to make a suggestion in regard to the much vexed question of dental and medical education, that to me seems the best way to benefit both professions. I do not propose now to advocate the suggestion, but simply to record a text for consideration.

I suggest that in all medical schools there should be a chair devoted to dentistry, as a part of general medical education; and that all special dental schools should receive as pupils only such as have a medical degree.—D. VAN DENBURGH.

A CARD—REPLY.—TO THE EDITOR OF THE DENTAL COSMOS: A card appeared in the April number of your journal signed by several dentists of our neighboring cities, in which they profess to give an account of a controversy between myself and another dentist of this place (Ithaca, N. Y.). This account either displays deplorable ignorance or is a gross and willful misrepresentation of the facts of the case. A decent regard for my personal and professional reputation compels me to send you this reply, in order that both sides may be heard, and that the public may judge whether these gentlemen were demolishing a man of straw, or were anxious to identify themselves with an episode in professional experience here which has long ago been amicably settled between the real parties.

The "card" announces as a sort of preamble that "certificates from a number of dentists in different places in the State of New York are published, in which they are placed in an attitude of disapproval of continuous-gum work." That assertion is without foundation in fact. No such extracts were ever published in an advertisement or otherwise; nor can they point to a single line or word written or spoken by myself against the merit of the work in question.

The signers of the card also therein assert—referring to their letters—that "nearly all regretted that a want of proper appreciation on the part of the people did not warrant us in keeping up furnaces for its manufacture." With all the letters before me, I assert that not a single one contains such a statement.

They also accuse me of "surreptitiously" obtaining these certificates. That I also emphatically deny. All these gentlemen were frankly and openly written to by myself, asking a reply by return mail, to ascertain how many dentists were using "continuous-gum work," and if it had increased or decreased in popular favor. It was with reference to these two questions, and these alone, that their names were used and published. There was no deceit or concealment, and I had no intention to misrepresent them. I have my inquiry and their letters in response, together with the publication of which they complain, open for inspection, should any one question the correctness of my statement.

In regard to myself, I confidently refer to friends and patrons, among whom are persons whose reputation and standing are well known throughout this State, and also to any member of our profession in this village.—F. S. HOWE, *Ithaca, N. Y.*, May 9th, 1878.

THE

DENTAL COSMOS.

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ORIGINAL COMMUNICATIONS.

DENTAL PATHOLOGY AND THERAPEUTICS.

BY J. FOSTER FLAGG, D.D.S.,

FORMERLY PROFESSOR OF DENTAL PATHOLOGY AND THERAPEUTICS IN PHILADELPHIA DENTAL COLLEGE.

[Entered according to Act of Congress, in the year 1873, by J. Foster Flagg, D.D.S., in the office of the Librarian of Congress at Washington.]

(Continued from page 359.)

X. *Inflammation of the pulp.*—This cause of periodontitis is one to which especial attention should be given, not only from the fact that it is usually more difficult of diagnosis than any other of the more tangible causes, but from its being almost always associated with conditions excessively acute or decidedly chronic, and frequently with peculiarly irritable tendencies, both local and constitutional, which, again, are equally markedly dynamic or adynamic, thus rendering its control a matter of no easy accomplishment.

Indeed, the diagnosis of "periodontitis from inflammation of the pulp" having been made, it is usually the most careful and exact treatment alone which eventuates in successfully combating the disease.

As the sequence to any pulp-irritation due to deep-seated caries, almost or complete pulp-exposure, pulp-nodules, proximity of conducting or impervious filling material, unsuccessful pulp-capping operations, and the like, the intermittent or remittent paroxysmal odontalgia, which announces inflammation and death of consecutive portions of pulp-structure, is ordinarily *unattended by any marked tenderness from pressure upon the aching tooth.*

There may be a *modification of sensation* from pressure, but this is quite as likely to be a diminution of pain as it is to be any aggravation.

This absence of pain upon pressure sometimes continues through many paroxysms of severe suffering, and *almost always* until the terminal portions of canal filaments of pulp become implicated.

This is so usually the case as to be, quite ordinarily, a safe guide for location of irritation; *but exceptions occur*, as has been stated in connection with pulp-nodule complications, pulsating pulps, and also in cases of excessive local or systemic irritability.

There is, however, *one symptom* which indicates very reliably the complex pathological condition of *periodontitis from inflammation of a pulp*, which is the peculiar *duplex character* of the pain by which is *added* to the tenderness, upon pressure, the throbbing and the sense of tooth elongation, a decided alternate exacerbation and amelioration of suffering.

This is due to the continuance of pulp-paroxysms in connection with the gradual increase of inflammation of the peridental tissues, and, recognizing that the condition, which these paroxysms indicate, is the intermediate one between the original irritant and the existing periodontitis, curative treatment is based upon this knowledge.

Treatment, then, for periodontitis from inflammation of a pulp consists, *first*, of removal of the original cause of irritation. If this be due to pulp-irritation from external irritants, through an open cavity of decay, the appropriate medication with phenol-sodique, oil of cloves, oily carbolic acid, or acetate of morphia paste, for their soothing effects, is indicated; but if the irritant be conducting or impervious filling material, or if it be an unsuccessful pulp-capping, it should be removed, *unless* the position of the previous operation be undesirable for the future work of extirpation of the pulp. If this be so, any interference with the filling is, ordinarily, not only unnecessary but unadvisable, and an appropriate entrance *into* or *toward* the pulp-cavity should be obtained by the removal of some other filling, or by drilling.

The object now is twofold,—the reduction of the inflammatory action about the root of the tooth and the present soothing and, almost invariably, the immediate future devitalization of the pulp.

The method of accomplishing the former of these results will be given under the head of "treatment of periodontitis;" but I desire at every opportunity to direct attention to the importance of *preparing excessively irritated pulps* for devitalization.

Much pain, in ordinary cases of pulp-irritation, even when confined to pulp-structure, is frequently inflicted by attempts at arsenical devitalization.

The altered functional action dependent upon inflammation of a pulp precludes the absorption of a sufficient amount of arsenious acid to produce its usual devitalizing effect, and yet seems to permit the taking up of just enough of the poison to act as a powerful irritant.

We may thus have long-continued, terrible suffering as the result of such injudicious medication, while yet using the very medicament upon which, properly applied, we can rely for obtaining final comfort.

The operation of removing a filling from a cavity so situated as to afford convenient access to the pulp, is a matter requiring comparatively little skill, though it should always be done with care and gentleness; *but the drilling* of an opening toward and especially *into* the pulp-cavity is a manipulation of great delicacy, and demands, for its *acceptable* accomplishment, a rare degree of knowledge, judgment, and educated touch.

It is better that the pulp be approached in its bulbous portion rather than in the direction of its cornuæ or attenuations, as in that manner one can not only gain nearer proximity to the pulp-cavity with less infliction, but the applications, either soothing or devitalizing, are placed in a position more favorable for securing a prompt and satisfactory result.

A decidedly spear-pointed drill should be used (after the enamel is "spotted" by means of a rose or inverted cone drill), and the drill should be very sharp, that it may *cut* without *friction*. In cases where dull drills are very painful, sharp drills are *almost* painless.

It is in cases such as these that the *steady* "motor" motion to the dental engine asserts its great superiority over the uneven, surging motion of foot-power, and this is increasingly evident, just in proportion as gentleness and slowness of rotation are attained.

With electric, hydraulic, or pneumatic motors these operations are done in a manner alike satisfactory to patient and operator, and, as an earnest advocate for painless dentistry, I feel it proper to urge the vastly more general trial of these pieces of mechanism.

Confidently believing that the day is rapidly approaching when the preparation of cavities, and the various operations which are strictly entailed by the *treatment of teeth*, will consume by far the largest portion of that time which is now allotted to the introducing of fillings, and heartily concurring with the views of my friend, Prof. C. N. Peirce, that "just in degree as the manual labor of dentistry is lessened, so will its members become more truly *professional*," I hail with pleasure, and advocate strenuously, the adoption of all appliances, methods, and materials which experience shall indicate as likely to advance toward so desirable a consummation.

The object of using a *decidedly* spear-pointed drill for the approach to a pulp is, that by this form is secured the greatest immunity from danger of passing suddenly *into* the pulp-cavity.

As the fine point of the drill is brought into close contiguity with the pulp, until it may possibly even *touch it* without any serious infliction of pain, a knowledge of this proximity can be given to the operator by slight intimations, either by sound or sign, from the patient, while the widening of the drill-point prevents the *probability* of immediate pulp-puncture.

While in some cases the jarring and friction of a large drill is not endurable, and a small, fine drill has, therefore, to be employed, *it is, nevertheless, better* that the orifice should be *as large as possible*, that it may permit of the introduction of a notable amount of medicament, be it pain-obtunding or devitalizing, *or both.*

If it is found impracticable to make a large or near approach to the pulp by drilling, it becomes a question as to the propriety of removing the filling of original irritation, or some other filling, which may possibly be more readily and less expensively reinserted, not for the purpose of definitely "treating" through such cavity, but, for the placing of such soothing and, subsequently, obtunding applications as shall permit, subsequently, drilling fairly into the pulp-cavity, and the subsequent devitalization and thorough extirpation of the pulp.

It also becomes a question as to the relative amount of infliction which would pertain to the act of plug-removal (remembering that the tooth is very tender to the touch), and *that* which would pertain to the delay incident to such *dentine-obtunding* as would permit of further drilling.

It must be noted here, that I refer *only* to tenderness of *tooth-tissue* (dentine), due to pulp-irritation as an interference to drilling, while I also refer to *tooth-tenderness* as an interference to removal of fillings.

The methods for overcoming periodontitis as an obstacle to tooth-drilling will be given in place, under "treatment of periodontitis." But the *only* method for removing the obstacle of dentine-tenderness is the application of arsenious acid, or its equivalent pulp-devitalizer.

The same means for relief from *mechanical irritation*, which are all-sufficient for drilling, are not admissible for relief in plug-removal, as the manipulations are so essentially different.

If it is decided to *make arsenical applications* for the purpose of a continuation of drilling, it will be found that applications of *from one to two hours' duration* will, each, usually permit of notable advance, and it will also be found amply compensating that two, three, or even more visits, if needed, should be made during one day, to continue drilling until a fair pulp-exposure is accomplished.

I do not remember ever to have had a case in which this was not *comfortably* done during one day.

I have already referred to the danger of arsenical applications *outside of teeth*, in contradistinction to their almost positive safety when perfectly secured *inside of teeth.*

I wish to impress my convictions in this direction at this time, and to urge the exercise of the utmost caution in regard to a thorough, careful securing of the arsenic in these drill "pockets." Particularly is this important in molars and bicuspids of the *lower* jaw.

In these teeth the drill-holes are *most properly* made upon the mesio-buccal part of the teeth, and thus the cheeks lie in close proximity to the orifice; it is for this reason that, in the absence of exceeding care and, most assuredly, with any manipulation in the least degree careless, *seriously painful and very slow-healing ulceration of the cheek* is almost sure to follow.

The method I adopt for security in these cases is, the placing of the arsenical application at the bottom of the "pocket," by means of a small probe; then, moistening a pin-head piece of cotton in oily carbolic acid, it is gently, but thoroughly, pressed into the drill-pit. All surplus arsenical paste and carbolic acid is then *carefully* wiped away, and a *dry* pin-head pellet of cotton is used to close the orifice. The *outside* of the dry cotton is then saturated with a portion of thick solution of gum sandarac.

So soon as fair exposure of the pulp is obtained, the treatment should be pain-obtunding in the extreme. Paste of oily carbolic acid and acetate of morphia, dental tincture of aconite, aconitia paste (ol. carophylii, j gtt.; aconitia, one-tenth gr.; morph. acet., j gr.; sufficient for *ten* applications), or some such *notable* pain-obtunders here prove their value, and *ordinarily* so quiet the "intermediate" painful dying of the pulp as to render the employment of no other than the simplest antiphlogistic local applications necessary for the resolution of the peridental inflammation.

But it is in the *extraordinary* cases of *peridontitis from inflammation of the pulp* that, even with all the skill and accuracy of the most proficient, it is found that local and systemic conditions combine to baffle one most completely.

Short periods of comparative relief, sometimes a season of almost entire cessation of pain, will encourage the hope of success, and stimulate to continued treatment; but the "*knowledge of the presence of the tooth*" is never absent, and as step after step is, seemingly, gained in the contest, the partially vanquished inflammatory action will repeatedly rally until it *rages triumphant*, after every expedient for relief has been exhausted.

In such cases, if the salvation of the tooth be worth the final effort, the most energetic and persistent treatment, both local and constitutional, should be directed to the end that *suppuration* be induced.

The minutiæ for this will also be given in its proper place; but I would here say that, in these troublesome cases, even the *last resorts* of ordinary general treatment are sometimes so much modified by the peculiar temperamental concomitants which cause such marked deviation from usual pathological demonstrations, that remedies *almost specific* in their therapeutic character will lose all value. Tonics cause nausea, irritability, and weakness. Obtunders give no relief, but rather aggravate. Stimulants, instead of hastening on to suppuration, only burn unbearably or simply do nothing, and narcotics make the patient *wide awake*, and culminate by bringing dreadful headaches.

In such conditions even *we* are reduced to the prescription of the *general practitioners*, and can only recommend *our* "change of scene and air"—*extraction!*

(To be continued.)

ALVEOLAR ABSCESS AND NECROSIS—SULPHURIC ACID VERSUS CREASOTE.

(Read before the New York Odontological Society, Nov. 21st, 1877.)

BY J. N. FARRAR, M.D., BROOKLYN, N. Y.

No. II.

(Continued from page 373.)

Of the three classes or varieties of dead bone enumerated, the experiments referred to were made principally upon the first and second, because their more compact nature (especially that of the first class) furnishes more satisfactory opportunities for ascertaining, among other important points, the *ratio of chemical action of different solutions of sulphuric acid upon dead bone.*

The use of such bone as belongs to the first class not only confines the action of the acid to its surface, but renders it possible to get each piece of bone more nearly of a certain size, shape, and weight, which is necessary in order to get a uniform area of surface for the acid to act upon, and also to admit at the close of the experiments of thoroughly cleansing the *débris* from it, in order that by weighing it and noting the difference we may learn the degree of action of the acid solution, —information which cannot be satisfactorily obtained with a material so open and porous as necrosed bone, because the *débris* cannot be thoroughly removed from its interstices after being subjected to acid. The comparative action of the different solutions of acid determined in this way, even under all shades of circumstances possible in the laboratory, is not supposed to show the *exact* degree of their action upon porous bone, like that of the third class, even in the dry state; but knowing their relative action upon compact bone, although this result may be less in amount or degree, we may reasonably infer that the same ratio will hold good upon all classes of dead bone. These points of information seem to me of great value in leading to correct conclusions by deduction, more especially in view of the fact that there are some solutions which under the most favorable circumstances have little or no disintegrative power, even upon the most frail specimens of necrosed bone proper. I refer to those of aromatic sulphuric acid, which I denominate alcoholic solutions.

While it is intended to show by the comparative destructive action of the different solutions of acid their approximate medical value, I shall not discuss the relative merits of separation of the dead bone by exfoliation and by artificial means,—with instruments. Both are advocated by eminent surgeons, and both processes have their value under varying circumstances. Neither shall I try to explain that which no one has as yet satisfactorily done, the physiologico-pathological process in the establishment of the so-called line of demarkation, which is so essential in the detachment of the dead from the living portion of the bone. What I do hope to make plain is, that there are differences in the medical value and in chemical action between the aqueous and the alcoholic solutions. That while both may have a stimulating influence upon diseased tissue, and especially upon that portion included in the "line of demarkation," there is some evidence that the aqueous solution does not have this power to such a degree as the alcoholic, but it does have a greater disintegrative power upon any portion of bone already dead. This possibly may be the reason why a somewhat more speedy loosening of the sequestrum is noticed when the aqueous solution is used after alcoholic solutions have failed, due probably to an acceleration in the destructive action on the particles of dead bone lying along the "line of demarkation," where nature appears to act more vigorously than at other points.

To confine experiments entirely to absolutely pure acids would be unprofitable. The approximate comparative chemical action of the absolutely pure acids, compared with the commercial (which are always impure), upon the three varieties of bone, and especially upon the necrosed bone proper, belongs to the series of unfinished experiments. I speak of the different varieties of the acids, because a knowledge of all enables one to draw more intelligent conclusions.

On the table are sixty bottles containing the solutions and the results of experiments upon the first and second classes of bone; also, on these eleven card-boards are specimens of bones and teeth which have been treated with the different solutions. At home I have several more containing the results of various solutions of pure sulphuric acid upon the third class (necrosed bone), but as the series is not completed I did not think best to bring them here; therefore they will only be referred to incidentally. In the first eight bottles before you the solutions were made from the commercial sulphuric acid of the shops, containing a large per cent. of impurities.* The second series of eight bottles contain solutions made from a better quality of commercial acid, and although containing a trifle of foreign matter (impurities), they are as free as can be obtained at the retail shops. At home I have two more series of seven bottles each, belonging to a larger combination of an unfinished series, which are made from absolutely pure acids prepared regardless of expense (in a college laboratory). I will refer to these again.

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* Sulphate of potassa, sulphate of lead, hyponitric acid, arsenic, chlorine, are the usual impurities to be found in even the best commercial acids.

That the impurities commonly found even in the best commercial acids may have some trifling, unknown, and unascertainable influence upon the living tissues, admits of but little doubt; but that they modify the chemical disintegrative action upon dead bone there is no reason to believe. Some of the experiments made with the various aqueous and alcoholic solutions of sulphuric acid, which I shall refer to, have as much value to us in their negative results as otherwise.

This double series of sixteen bottles, as well as the fourteen absent bottles referred to, contain the results of experiments made, not only to show the disintegrative powers of the different aqueous solutions of sulphuric acid, but also approximating the comparative degree of their chemical action upon bone.

In order to have compact bone, the pieces experimented upon in these sixteen bottles were cut from the femur of an ox recently killed, and were nearly of the same shape, and each weighed exactly one hundred and twenty-seven grains. In the other series referred to the pieces were cut with great care and pains with a trephine from the tibia of the ox (this bone seeming more desirable because more compact), which were afterwards filed on the medullary surface until reduced to exactly the same thickness and weight (fifty-five grains), so that they all had a smooth and hard surface on all sides.

Each bottle of each of these series contains an equal quantity of an aqueous solution, varying in degree of strength as follows: one part of acid to three, four, five, six, seven, eight, and nine of water respectively. Two of the bottles contain aqueous solutions, with the same per cent. of sulphuric acid as the acid. sulph. aromat. of the United States Pharmacopœia. Placing in each of these bottles one piece of bone weighing one hundred and twenty-seven grains, and in those of the absent series fifty-five grains, they were then put into a pan of water over a steady burner, and held continuously at the temperature of 100° Fah. for seventy-two hours,—these in darkness, the others in light during the day. At the end of this time the remnants of the pieces of bone were removed, washed, and placed in pure water to remove the acid, then dried, weighed, noted, and tied to the outside of the bottles. Upon comparing their weights before and after the experiments, it was found that the degree of chemical action had varied considerably, as may be plainly seen by a glance at the bottles containing the different precipitates, which, though abundant in all, differ materially in amount, showing the great disintegrative power of aqueous solutions upon dead bone under the conditions named.

The various degrees of chemical action upon these pieces of bone are better shown by the following tables of comparative results. I should say, however, that in Table No. 1 the first eight bottles belong to my first series, and the others belong to a second, a repetition of the same sort of experiments. The acids came from different shops, and were of the impure qualities referred to, though said by the druggists respectively to be the best commercial quality; but, as regards this point, let the results speak for themselves.

Table No. 1.

			Loss.	
Bone.	Acid.	Water.	First Series.	Second Series.
127 grains.	1 part.	3 parts.	35 grains.	78 grains.
127 “	1 “	4 “	40 “	39 “
127 “	1 “	5 “	36 “	46 “
127 “	1 “	6 “	19 “	30 “
127 “	1 “	7 “	18 “	25 “
127 “	1 “	8 “	24 “	25 “
127 “	1 “	9 “	8 “	28 “
889 “			180 “	271 “

In these two bottles are the solutions referred to, composed of water containing the same per cent. of sulphuric acid as is present in the aromatic sulphuric acid (U.S.P.), viz., about ten per cent. (9.61) of real sulphuric acid (H_2SO_4), or about eight per cent. (7.75) of dry acid (SO_3). A piece of bone of the same weight (one hundred and twenty-seven grains) was placed in each, and subjected to the same conditions as the others for seventy-two hours. The first specimen lost sixteen grains, and the second lost twenty-six grains.

The following tables show the results of the absent series of experiments made with absolutely pure ordinary and Nordhausen acids. These were conducted under the same circumstances as the others (at 100° Fah. for seventy-two hours), but at the close of the first forty hours they were weighed, to ascertain the difference of the action of the acid upon the bone at different periods of time.

Table No. 2.

			Loss.	
Bone.	Pure Ordinary Acid.	Water.	In 40 hours.	In 72 hours.
55 grains.	1 part.	2 parts.	5 grains.	23 grains.
55 “	1 “	3 “	21 “	55 “
55 “	1 “	4 “	14 “	30 “
55 “	1 “	5 “	4 “	35 “
55 “	1 “	6 “	9 “	25 “
55 “	1 “	7 “	5 “	23 “
55 “	1 “	8 “	1 “	17 “
385 “			59 “	208 “

Table No. 3.

			Loss.	
Bone.	Nordhausen Acid.	Water.	In 40 hours.	In 72 hours.
55 grains.	1 part.	2 parts.	10 grains.	43 grains.
55 "	1 "	3 "	15 "	44 "
55 "	1 "	4 "	18 "	35 "
55 "	1 "	5 "	14 "	25 "
55 "	1 "	6 "	12 "	31 "
55 "	1 "	7 "	14 "	41 "
55 "	1 "	8 "	12	23 "
385 "			95 "	242 "

It will be noticed that, owing to the increased weakening of the acids, caused by these experiments being made in the *same solutions during the entire seventy-two hours*, the degree of destructive action upon the bones has not been so great in proportion to the duration of the time as was shown in the first experiment referred to (p. 372), where the solution was renewed every twenty-four hours. Still, the law is all the better demonstrated in most of the experiments in the fact that there is an increased destruction shown (though more limited) even after the acids have become considerably destroyed by their earlier union with the calcific matter.

I must say that upon ascertaining the wide differences in the amount of precipitates and the irregularity in these steps, I was not a little surprised and disappointed, for I had a hope that I might arrive at some rule in the preparation of solutions which would enable me to obtain any desired degree of potency for action upon bone. The comparative results of the two varieties of acids show that the Nordhausen is more effective, and the ratio more regular.

The comparative results of these experiments are not given to prove that chemical action of sulphuric acid does not follow an exact law, but to show that mechanical causes over which we do not always have control may be sufficient to render our calculations in regard to the rate of action of acid on dead bone uncertain, especially upon necrosed bone, notwithstanding its porosity, when subject to so many hindrances while in the living jaw, as have been referred to. Besides this, as may be inferred from the great difference between the results of the first two series of experiments, there can be no great degree of certainty as to the quality obtained, even from our "best retail shops," and even if this objection could be obviated, there still remain the variations which show that results in practice must depend largely not only upon the kind and quality of the acid, but upon the condition of the bone,—its degree of porosity, the amount of surface area (generally very limited) upon which the acid may act, and the general health and age of the patient.

These natural surroundings have much to do in determining the progress and results of necrotic diseases. In truth, I believe that in many cases medicine has received credit for curing necrosis when nature could have worked out her own cure earlier and better if she had not been injudiciously meddled with.

It will be seen from the foregoing results that the rate of action of acid upon bone increases in degree with the duration of time it is subjected to it. When dead bone of any kind is placed in acid solutions, even the strongest and under the most favorable circumstances, the action is exceedingly slow, indeed, so slow is it that no perceptible action can at any one moment be noticed. A few minutes after bone is subjected, minute bubbles may sometimes be seen collecting upon the bone and occasionally rising to the surface of the solution, but after several hours, the effects of disintegrative action appear upon the surface, and steadily increase until a precipitate is noticed on the bottom of the bottle. Effervescence is due to the action upon the carbonate of lime only.*

I think the person who once said to me that he could "hear a hissing sound" caused by acid solutions of 1 to 4 when applied to necrosed bone in the jaw must have had acute auditory nerves. The only way I have ever been able to hear the effervescing action upon bone by sulphuric acid was when I added it to fine bone-dust.

Having shown that an aqueous solution of sulphuric acid has power to disintegrate dead bone, even of the most compact nature, *if freely in contact long enough*, let us turn our attention to the alcoholic solutions, in order to compare their chemical power.

In order to obtain some idea of the comparative chemical action of the two forms of acid solutions—alcoholic and aqueous—side by side, I subjected to both of them, containing exactly the same per cent. of sulphuric acid, not only pieces of ox femur, belonging to the first class of dead bone, but also very old specimens of aged human jaw-bones and teeth, belonging to the second class.

In these two bottles are the solutions used in one series of experiments. The aqueous solution has caused decided chemical action upon the bones and teeth, producing a large amount of precipitate, five-eighths of an inch in depth. The aromatic sulphuric acid (U. S. P.) has but very slightly affected the specimens,—practically, we may say not at all,—a trace scarcely noticeable.

What is noticeable here holds good with necrosed bone, but upon this point I will now only say that, judging from experiments thus far completed with these solutions upon all the varieties of dead bone, including necrosed bone, I am satisfied that aromatic sulphuric acid *per se* is not practically a dissolver of dead bone, and what trifling action it has, strange as it may seem, is chiefly if not entirely due to the association of water contained in the alcohol, of which it is partially composed. Therefore it is evident that alcoholic solutions of sulphuric acid, if they are beneficial at all, and I believe they are more or less so, must exercise their power in some other way than by chemically disintegrating dead bone. How this may in a measure be so can be inferred from the fact that sulphuric acid, cinnamon, and ginger are all stimulants as well as alcohol, and the local application of alcohol alone, from times of old, has been known to be beneficial in some conditions of diseased tissue.

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* The relative proportion between the two forms of lime in bone is about 57.35 of phosphate of lime to 3.85 of carbonate of lime in 100 parts.

The questions. Why this difference in the action of the two solutions on bone? Why is the absence of water suspected to be a cause of the inaction of the alcoholic solution? Why may it not be due to some ingredient in the aromatic acid which prevents disintegrative action? are natural, and in reply I will say:

All who are at all familiar with analytical chemistry well know how important water is in assisting in breaking up combinations, both by furnishing chemical elements from itself and in being a medium for the solubility of others. Notwithstanding these facts, in order to answer the queries by negative arguments through the process of exclusion, three "broken" solutions of aromatic sulphuric acid were made by leaving out of each bottle one or more of the vegetable elements and retaining the acid in all. Pieces of bone of equal weight were subjected to each of these for forty-eight hours at 100° Fah., followed by forty-eight hours of ordinary temperature in October. In these three bottles may be found the solutions with the precipitates—earthy and vegetable—formed in each. No. 1, containing all the ingredients of the aromatic sulphuric acid, except cinnamon, shows slight traces of colored precipitate. No. 2, containing all except the ginger, has also a slight precipitate similar in appearance. No. 3, containing all except the cinnamon and ginger, a colorless solution, shows a slight trace of precipitate, and unlike the others, is of a bone color (it is bone-dust); which indicates that the other precipitates, which are of a reddish-brown color, are chiefly of vegetable matter from the solution, and almost entirely from the cinnamon and ginger; a slight earthy precipitate probably is also present.

In order to further test these broken solutions, seventy-four grains of ox femur were subsequently submitted to each, and kept at 100° Fah. continuously for seventy-two hours, and then reweighed, and were found to have lost nothing perceptible to the scales, although there was a very slight trace of precipitate in the bottles like that shown by the other experiments. In all my experiments with alcoholic solutions the precipitates are so limited that they can only be seen by looking through the bottoms of the bottles.

In this bottle is a portion of the chin-bone of a very aged person.

The bone had been dried in the college attic for many years, until little else than earthy matter was left, and was in such a frail and porous condition that the fluid could permeate every part of it as if it were a sponge. At the end of twenty-four hours in a cold solution of aromatic sulphuric acid (U. S. P.), followed by seventy-two hours at 100° Fah., there was only the slightest evidence of surface action.

To further test and to make sure that the degree of purity of the acid is not the cause, I carefully prepared four bottles containing twenty-five centimetres each of aromatic sulphuric acid solutions from absolutely pure qualities of acids. One contained a solution made from absolute alcohol and ordinary sulphuric acid. Another contained a solution made with 85 per cent. alcohol and ordinary acid. The third contained a solution made from absolute alcohol and Nordhausen sulphuric acid. The fourth contained a solution made from 85 per cent. alcohol and Nordhausen acid. In other respects these solutions were made by the aromatic sulphuric acid formula.

In these bottles were placed several small pieces of very soft necrosed metatarsal bones, several small pieces of very porous necrosed alveolar process, one piece of necrosed skull-bone, a cuspid tooth with a large piece of ordinary alveolar process attached to it, and a piece of salivary calculus. The solutions containing these specimens were then held at a temperature of 100° Fah. for seventy-four hours (exposed to light during day-time). After careful examination and reweighing, I found that the metatarsal bones were somewhat softer and to a very slight extent chemically affected; the edges partially fallen to pieces, where originally frail and spongy, but the main portions remaining intact. This appeared to have been caused more by the long-continued maceration than by the acid. I have found the same condition to take place after boiling frail bone in water. The piece of necrosed skull-bone had lost nothing in appearance or weight, neither had the tooth and process, or the piece of salivary calculus,—an important point to remember. These specimens were not in the green state, but had been drying for several months; but although there may be a trifle of difference between green and dry specimens, the difference in the results after such treatment is extremely slight. I could see no appreciable difference between the results from the two acids, although aqueous solutions show a difference between the action of the ordinary and Nordhausen acids upon bone. Although there probably was some difference, I could not distinguish any between the action of the four solutions upon the necrosed bone, on account of scarcity of the precipitate.

An interesting and instructive lesson, however, regarding the value of water, was learned when I had subjected a piece of ox femur of the most compact nature, weighing one hundred and twenty-seven grains, to a solution of equal parts of aromatic sulphuric acid (U. S. P.) and water at a temperature of 100° Fah. for seventy-two hours, and found, as may be seen in this bottle and by the bone attached to the outside, that quite a vigorous destructive chemical action had taken place. Though less in degree than that from experiments with aqueous solutions, the surface of the bone has softened for about one-twelfth of an inch in depth, showing that though the presence of water reduced the quality of the acid solution (U. S. P.) one-half, its chemical power upon bone was far greater. These results, of course, will naturally surprise those who have entertained the belief that aromatic sulphuric acid *per se* is a vigorous disintegrator of dead bone.

(To be continued.)

SEPARATING TEETH.

BY THEODORE F. CHUPEIN, D.D.S., PHILADELPHIA.

Inquiries having recently been made of a considerable number of dental practitioners with reference to a suspected tendency to a return to former modes of practice in the use of non-cohesive instead of cohesive gold foil, to hand-pressure instead of mallet-force, to separations between the teeth in cases of proximate decay instead of contour fillings, the majority of the responses indicate that non-cohesive gold foil is being used more than formerly (especially at the cervical border of proximate cavities), either entirely or in conjunction with cohesive foil, and partly with hand-pressure and mallet-force, and that the making of separations between the teeth in cases of proximate decay is finding more favor than strictly contour work.

Being well satisfied that self-cleansing separations are more advantageous than contour work, we propose to offer some suggestions upon the manner of treating caries, either superficial or deep-seated, when occurring between the teeth.

To begin with the six upper front teeth. Our practice is, when we suspect proximate decay, either deep or superficial, to separate them well by any of the approved methods,—with cotton, rubber, or wedges. When well separated we fill the space gained with cotton steeped in sandarac varnish, which, soon hardening, holds the teeth in their new position, and allays almost entirely the soreness consequent upon the wedging. This space secured, we take a blank mandrel (Fig. 1), such as is used on the lock-bit right-angle attachment of the S. S. White dental engine. This we put in the chuck of a lathe, and turn it down to the form of Fig. 2. If a lathe be not at hand, a worn-out bur drill, such as are used in the attachment named, with the bur broken or filed off, will answer. The blank mandrel, thus prepared, is now mounted with a

Fig. 1.

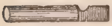
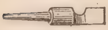


Fig. 2.



corundum point. These points can be had at the depots,—Butler's corundum points for porte-polisher. We find these, however, too large, and prefer those made as follows: taking a broken corundum-disk, we hold it over a spirit lamp until it softens, then manipulate it with the fingers into a cylinder, subsequently making it smooth and regular by rolling between two plates of glass, (Fig. 3), and then dividing it into half-inch lengths. With an old excavator, filed to a fine point and heated, a cone-shaped hole is made in one end of these pieces (Fig. 4), into which the little mandrel (Fig. 2), then heated and coated with shellac, is inserted. This is now put on to the lock-bit attachment, which is applied to the hand-piece of the engine and revolved, the end being held over the blaze of a spirit lamp, and as it slightly softens is brought to a point between the thumb and finger, as in Fig. 5.

FIG. 3.

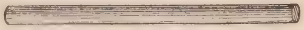
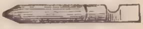


FIG. 4.

FIG. 5.



This point is brought to bear on the decayed proximate surfaces of the teeth in question, the head being thrown back, and the decayed surfaces approached from the palatine aspect through the space gained by wedging. By means of this point, and one shaped as in Fig. 6, mounted on a similar mandrel, we claim that a perfect self-cleansing space can be secured, amply sufficient for filling, should filling be found necessary, without in the least marring the external form or beauty of the teeth, and leaving no shoulder where food might be retained, and without causing any irritation to the teeth in the operation, and effectually preventing a recurrence of decay at these points. Fig. 7 illustrates the appearance of teeth which have been operated on as above described, viewed from their palatine surfaces, the labial surfaces presenting no disfigurement. Such extreme cutting as is represented will not often be required to secure the preservation of the teeth operated on—simply enough to keep the surfaces washed and clean. We do not claim any originality for this principle, for Dr. Arthur recommends the same style of cut, which he effects by chisels, and Dr. Bonwill produces the same result with the diamond reamer. It is, however, almost impossible to mount a diamond on a mandrel so true that, in doing such work as is represented in Fig. 7, it will not jar the teeth considerably, and produce a noise unpleasant alike to patient and operator. We have tried to overcome these objections, and to show a method of obtaining the same results which should be within the reach of all. In this lies our only claim to originality.

FIG. 6.

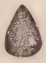
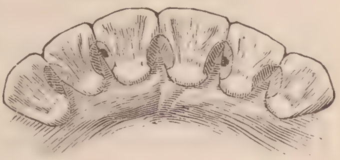


FIG. 7.



For separating the molar or bicuspid teeth, the ordinary corundum disks (Fig. 8) are about the proper size. We prefer those only a little over a half-inch in diameter, for reasons which will be apparent. It will often be found that decay will occur between the bicuspids and molars at a point slightly beyond the points of contact, as shown by the lines in Fig. 9. In such case, by the use of a large disk, the outer faces of these teeth would be disfigured before the decayed spots were actually reached; but, by the use of a disk of the diameter indicated, *pressed well up on to the gum*, and the engine *run at a high rate of speed*, the separation will be made, and the decayed spot fairly reached, with no external indications of the tooth having been operated upon. By this method, although the gum may be considerably lacerated by the disk, the operation will have been comparatively painless, because of the rapid revolution of the disk. Patients usually give no evidence of discomfort during the progress of such an operation; whereas, if the same be attempted by a slower rate of speed, it is pronounced unbearable. The cut produced by the disk will be of the form shown in Fig. 10; the wedge-shape of the disk leaving a sharp terminal point, as shown by Fig. 11, at which decay will sometimes but not always occur.

Fig. 8.

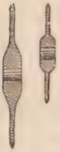


Fig. 9.

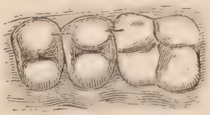


Fig. 10.

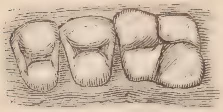


Fig. 11.

To obliterate this point is in some cases a matter of considerable importance for the ultimate preservation of teeth prone to decay. We have experimented considerably with corundum to make points small enough to obliterate these acute angles; have tried turning down an ordinary blank mandrel and mounting it as before described for operations on the upper front teeth, but such points, when small enough for the purpose, are not strong enough, and wear so rapidly as to be almost useless; besides, though made as small as possible, they were yet too large for our purpose, and were only serviceable after the teeth had been operated on by the disk as described. To change the acute angle left by the disk to this form (Fig. 12), the only article we have found available is that termed a "sugar-loaf bur" (Fig. 13). When the enamel is once removed by the disk, these burs may be used for a considerable time without becoming dulled. One of these—the smaller preferably—is attached to the hand-piece, and the engine started, carried to the point of juncture, and there held until the sharp angle is obliterated; the case presenting the appearance illustrated in Fig. 14.

Fig. 12.

Fig. 13.

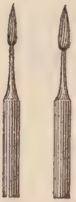
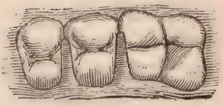


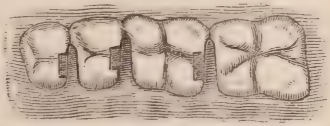
Fig. 14.



If filling becomes necessary, there is ordinarily sufficient room for the operation, but if not the teeth may be separated and filled. When they return to their normal positions there will always be a free space with the surfaces visible to the operator, and easily kept clean by the patient.

The lower bicuspids and molars are separated in the same manner by the disk, but the sharp angle in these may be obliterated with the "sugar-loaf bur," applied to the lock-bit right-angle attachment of the dental engine. When it becomes necessary to fill these bicuspids and molars, especially on their distal surfaces, the best mode of approach to the proximate decay is through the crown surfaces, as shown in Fig. 15. These are probably the most difficult cavities in the mouth to fill, particularly the second lower bicuspid—a turning-point in the dental arch difficult of approach and difficult of observation.

FIG. 15.



The utility of using a small disk for the separation of the bicuspids and molars is particularly apparent when we notice the form of the teeth, of which there is considerable variety.

FIG. 16.

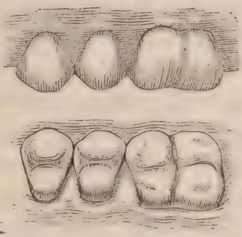
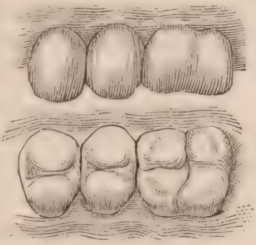


FIG. 17.



The illustrations, Figs. 16 and 17, will convey a better idea of these two extreme classes of teeth than any description. It is apparent that if a large disk be used on a case such as is represented in Fig. 16 the outer plate of enamel would be disturbed, and the operation would be a faulty one, for the reason that the more they are cut the larger would be the surface of contact—precisely the result we wish to avoid.

It is true that teeth of this form rarely decay, and when they do it is at a point indicated by the >< in Fig. 16, so that there is rarely any utility in separating teeth of this form with the disk, and, if it be done, a small disk should be used and great care exercised, so as not to disturb the natural points of contact on their buccal aspects.

We need scarcely say that all corundum disks and points should be kept wet while in use, and that subsequently to their employment all surfaces which have been operated upon by them should be well polished with fine pumice or other polishing powder by the use of rubber disks, wood points, etc.

THE NEW DEPARTURE.

BY S. B. PALMER, M.D.S., SYRACUSE, N. Y.

In the March number of the Dental Cosmos there appeared an editorial under the above title, in which Dr. Flagg, Dr. Chase, and myself are introduced as advocates of principles and practices "diametrically in opposition to the theory and practice which have generally obtained." The editor says,—

"For the purpose of definitely informing our readers of the points at issue, we publish the two creeds in juxtaposition."

The creeds then follow, which are the headings or titles to the various subjects composing a paper by J. Foster Flagg, D.D.S., read at a meeting of the Odontological Society of New York, November 20th, 1877. The paper, though of considerable length, little more than introduced the topics therein contained; much less could a short synopsis convey its true meaning. This, however, can be said of the editorial: it is a fair, unbiased collection of statements pertaining to the subject, all of which are given to the reader without any effort at editorial coloring.

On the other hand, the "New Departure" seems to meet the opposition common to advanced teachings of science. Well-known laws of physics, and principles which underlie every *successful* practice in operative dentistry—even of the highest order—are ridiculed and answered by sarcasm rather than scientific arguments, and that too, from those to whom general practitioners look for candid opinions, based upon unprejudiced investigations or practical knowledge.

While I do not enter into controversy, or take sides to destroy or establish any mode of practice, I feel it due to the readers of this journal that they shall receive a fair statement of the doctrines which are denominated the "New Departure."

First, let us see what Dr. Flagg says in the paper referred to, and from which comes all this bitter controversy. I will quote the exact language of the paper from page 15.

"It is for the *salvation of teeth* that I have come to speak to you to-night. I have spoken only with that end in view. I don't wish to speak of good, strong teeth—I don't wish *at this time* to tell you of my practice of to-day—what I am experimenting on, what I am tabulating. I have come only to tell you what I *have done*, and what conclusions I have arrived at as the result of experience and long years of practice.

"But I do not wish to say anything to you of the teeth which you are in the habit of filling successfully, and, as we express it, satisfactorily, with gold,—teeth of dense structure whose cavities have walls so strong that you can impact a filling which lasts a lifetime. But I do ask that you will gradually discontinue this packing of gold into teeth that are so poor, so frail, so unsubstantial that it is, to say the least, doubtful whether the result will be creditable to your profession or satisfactory to your patients."

Then follow remarks upon *plastic fillings* for a class of teeth not suited for the application of gold. When it is stated that we discard gold from practice, justice to those who receive information through dental journals demands that facts be given as to the conditions when, and for what, we abrogate its use.

As proof that I am not creating the opposition and charges made against our practice, I quote from discussions of the Mississippi Valley Dental Association, and I do so to acquaint the reader with the difficulties in the way of getting a fair representation of a practice which offers to no one greater benefits than to those who so unreasonably attempt to crush it out. In other words, I know of no way to conscientiously continue the use of gold in cases where experience has taught that it will prove a failure, except by the application of a knowledge gained by diligent study, and which is incorporated in the "Basal Principles of the New Departure." Desiring to avoid personal controversy, and in no way to provoke the same, I withhold the name of the speaker in the following quotation.

"In the reported proceedings of the Odontological Society of New York, Dr. Flagg said that gold, as a filling material for teeth, was entirely discarded. This New Departure has advocates in various parts. Dr. Palmer, of Syracuse, New York, has been experimenting, and the drift of his argument would lead us to conclude that gold is not a good thing to fill teeth with, and that these plastic materials are. Dr. Flagg, of Philadelphia, proclaimed the same thing. If what Dr. Chase, of St. Louis, says of the incompatibility between gold and tooth-substance is true, and the fact that stannous or tin gold is entirely compatible, we must conclude that gold is not a good substance for filling teeth."

Having already quoted Dr. Flagg's ideas, given in the paper from which the above conclusions are drawn, comment seems unnecessary. The reader can well imagine the wrong that would be done to the "New Departure" and its advocates, were the statements believed that the use of gold is discarded or condemned where it can be successfully used.

The principles advocated by the "New Departure," as I understand them, concede the use of gold as a filling material, wherever and whenever it can be used for the preservation of teeth as successfully as other materials. The "New Departure" begins where gold leaves off,—to help gold, if need be, to sustain its exalted reputation, and to furnish a substitute in other materials in cases where gold is inadmissible.

In support of the "New Departure" as a distinct practice, I have nothing to say, because I draw no lines between the old and the new. The changes which have occurred in my own administration have been gradual; an exchange of failures for successes, just in proportion as I have been able to associate cause and effect, and apply the proper remedies to prevent failures. The "New Departure Creed" will doubtless furnish material for discussion for a long time. This does not come within the range of this communication.

Drs. Chase and Flagg are quite competent to answer for the part they have taken in this matter. One thing, however, should be understood in connection with Dr. Flagg's own practice, which is, that *he* undertakes to demonstrate that teeth can be *better* preserved *without the use of gold* than with it. He feels that he is now daily *proving* this, and consequently he discards gold from his practice. Not that he cannot use gold, under some circumstances, as *successfully* as any other material (though not as *satisfactorily*); nor, that he condemns its use by others where they can *satisfactorily* use it.

The object of this statement is to present the subject fairly, and in a manner to prevent further misunderstanding of the real points at issue. So far as I am able to understand, my own connection with, and cause of offense in this movement, consists in making known that which science and practice convinces me *is true*, viz.: "Failure in operations is mainly due to incompatibility of filling material with tooth-bone"—which embraces the electro-chemical theory—and the indorsement of the other articles which constitute the "New Departure Creed."

All of which I most respectfully submit for the consideration of the thoughtful and progressive members of the dental profession.

PROCEEDINGS OF DENTAL SOCIETIES.

NEW YORK ODONTOLOGICAL SOCIETY.

(Continued from page 392.)

The following paper, entitled "Conservatism in the Treatment of Irregularities of the Teeth," by Norman W. Kingsley, M.D.S., of New York, was then read:

Webster defines conservatism to be "The disposition and tendency to preserve what is established; opposition to change;" and, paradoxical as it may appear, I make this my text for a few remarks upon the treatment of irregularities of the teeth. Two years since this honorable society gave a very respectful hearing to an inquiry into the origin of such deformities, and the *Dental Miscellany* for two or three years past has contained numerous articles upon the correction of such irregularities by mechanical appliances; the chief purpose of those publications being to demonstrate the possibilities of human skill in altering, eradicating, or improving upon unsightly features. The natural tendency of such reports would be to stimulate the inexperienced practitioner to apply the same means in cases appearing to him the same as those reported; losing sight of the object to be considered, and making the question of the propriety of interfering to rest upon the probabilities of a piece of mechanism performing a given work. I have called the title of this paper paradoxical, because, in the estimation of the ordinary observer, there can be no conservatism admissible if irregularities are to be treated at all; the argument being that an irregularity of position in the dental arch is an abnormal condition *per se*, and any treatment must favor change, and, therefore, cannot be conservative. But this argument is based upon a false foundation, as I shall maintain that irregularities of the teeth are not always deformities, and that there are multitudinous departures from a normal type where neither the utility nor the beauty of these organs, nor the symmetry of surrounding features, is seriously affected by the malposition.

Nowhere in developmental nature will we find mathematical uniformity in size, shape, or position. The trees of the forest take every conceivable form within the limits of their type. No two leaves are precisely alike. The two sides, even, of every leaf differ in outline. Every human figure differs from every other human figure; face from face,—even the two sides of the same face are not mechanically mated. Variation from mathematical precision in nature is universal, and any appearance of absolute regularity always suggests the interference of man.

The eye soon tires of the stiffness and formality of unbroken uniformity, and is only permanently pleased with the beauty which comes from graceful variation. If it were possible to bring all dental arches to one standard of arrangement, deformities of facial expression would probably be more common than now. An apt illustration of such a result is found in the limited variety in form of the artificial teeth in the market, and the still more limited skill in arranging and adapting them for service; consequently, there are seen all over the country prevailing patterns of teeth made in rows, devoid of grace, and inserted indiscriminately in the mouths of the beautiful and the mouths of the ugly.

Conservatism, in the liberal sense, ignores the bare possibilities of science, and considers only the benefit to the patient as of supreme consideration. Conservatism in its very essence involves a necessity for the profoundest judgment, and must include a knowledge capable of making the most accurate diagnosis. Conservatism is far-reaching in its observation backward into history, forward into destiny, and in making its diagnosis and prognosis takes into consideration the efficiency of the masticating apparatus, the enunciation of the voice, the organism of the teeth, the ravages of decay, the family type and the relation of the features, the constitution, temperament, and systemic condition of the patient, the sex, age, and social status, the causes of displacement, whether accidental, congenital, or hereditary, the means and appliances for correction, the time, trouble, and skill required of the operator, and the time, annoyance, and endurance of the patient, the risk of inflammation and of destruction of pulps, and, finally, the character and permanency of the change wrought. As before intimated, an extreme view of conservatism would leave all presentations of irregularities without treatment; but a true recognition of such a principle will not neglect treatment where benefit can be obtained, but will secure such a result with as little disturbance to the existing order of things as is possible. Cases are constantly coming before our observation where most remarkable achievements are within the scope of scientific skill, but where a conservative view would not justify the means required to produce such a result. Conservatism, therefore, would suggest the simplest course, even with less pronounced effect. From this stand-point we may very properly consider the removal of permanent teeth for the correction of an irregularity. An erroneous prognosis has maintained that the full number of teeth must be retained in the mouth, regardless of their organization, the progress of decay, the limited capacity of the arch, or the external features. But one idea seems to control such a judgment, viz., that a certain number of teeth are developed by nature, and, therefore, every one must be preserved. Such an argument might be of some force if we were passing judgment upon a normal condition of the human race, but, as the condition we are considering is wholly abnormal, the argument is of little value.

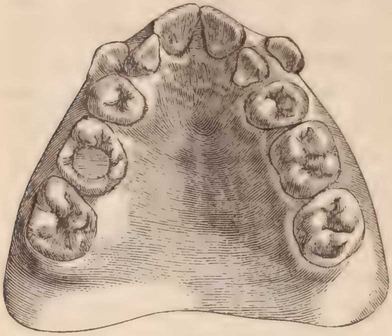
An experience of sufficient length to determine results has shown very conclusively that the retention of every tooth in the mouth is *not* necessary to the efficiency of the masticating apparatus, is not required to maintain the contour of the jaw, and the loss of certain teeth produces no visible external effects.

I have heard the statement gravely made, in an association of dentists, that the extraction of the first permanent molar produced such an effect upon the facial features as to be always perceptible, and that in a community where such dental practice was common the individuals who had lost their first molar teeth could be readily distinguished in an assemblage from those who had not. Such an absurd statement would be hardly worth repeating except to show how the imagination overleaped all reason. It comes within our daily observation that one-half the masticating power of the dental apparatus is not utilized, it being the exception that patients use equally both sides of the mouth, and this without any apparent detriment to digestion or general health.

The *articulation* of masticating organs is of much more importance than their number, and a limited number of grinding teeth fitting closely on occlusion will be of far greater benefit to the patient than a mouthful of teeth with the articulation disturbed. True conservatism lies not in the short-sighted, narrow-minded idea of retaining all the teeth under all circumstances, but rather in maintaining and preserving a larger benefit to the patient's general condition. Esthetically considered, it can hardly be claimed that a dental arch with all the teeth in contact is positively more beautiful than one where slight spaces occur, while experience is uniform in showing that in this age of degenerate teeth their durability is much enhanced by separation. This subject of the extraction of teeth that can be preserved has been discussed so much that it would seem almost superfluous to agitate it further, but it bears so important an influence on the treatment of irregularities that it cannot be ignored. It requires a profounder knowledge than most of us possess to decide always upon the wisdom of extraction, and when such conviction is settled the judgment may be equally at a loss as to the choice of teeth to be removed. The blunders which come before my notice from time to time in the removal of teeth to correct an irregularity are so inexcusable as to be a disgrace to our profession. While in many cases there may be very grave doubts about the removal of teeth for this purpose, there are others where extraction cannot possibly be beneficial, and where to do so would be little short of a crime. For example, there came to me recently a lady belonging to a well-known family in this country, bringing her daughter, about fourteen years of age, with a full mouth and moderately prominent teeth in both jaws. The teeth were regular in the arch, the articulation was good, and the only criticism would be upon the prominence of the teeth and the consequent expression of the mouth.

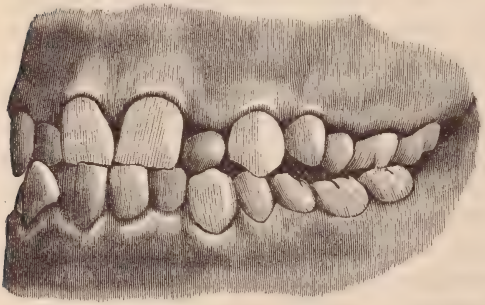
The arrangement presented to my mind every evidence of an inherited characteristic. The desire of both mother and daughter was to have the undue prominence reduced. My diagnosis of the inherited character of the presentation was sustained by my memory of her uncle and her grandfather, whom I had met, the expression of whose mouths was identical with the young lady's before me, although the father of the young lady was unlike the other members of the family in this respect. I declined to interfere, on the ground that whatever I might accomplish would be but temporary, the tendency of the jaw would be continually toward the inherited type, and ten years from this time the mouth would probably present the same expression as if nothing had been done. But in that mouth was exhibited the egregious blunder of a dentist (who is very wise in his own estimation) of having extracted from the lower jaw the first permanent molars on each side, both teeth being perfectly sound, and all the teeth articulating most accurately with those of the upper jaw, all of which were also sound. The explanation of the dentist was that he did it to allow the ten teeth forward of the space thus made to fall back, and thus reduce the prominence of the mouth. The fallacy and absurdity of such an expectation needs no comment. With a view to illustrate this subject as far as practicable, I shall introduce some models and describe the treatment. Fig. 1 represents the teeth of a young lady thirteen years of age. The features externally were regular excepting an undue prominence of the upper lip over the canines; the articulation of the teeth was not defective; the arch in both jaws was of sufficient capacity for distinct enunciation, and the teeth in the upper jaw were nearly in contact, but between the lateral incisor and first molar on each side there was but one tooth, viz., a bicuspid,—the other bicuspid and the canines were crowded out.

FIG. 1. (Case I.)



At the period at which this model was taken no history of the missing bicuspid could be obtained. The patient was uncertain about teeth which had been previously extracted, and there was no external evidence of the teeth being undeveloped. Believing, from a careful observation of all the appearances, that the bicuspids were hidden in the jaw, and could not emerge with the teeth crowded as they were, the first molar on each side was taken out to make room, and because they were defective. An apparatus was applied and the canines were brought into line, the first bicuspid being crowded back to make room. In a few weeks the missing bicuspids made their appearance

FIG. 2. (Case II.)

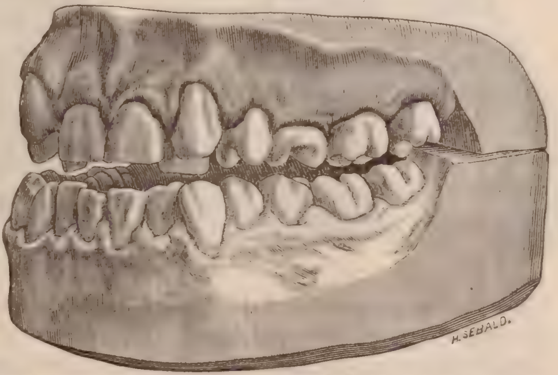


in the gaps of the extracted molars, and at this day the arch is full of sound teeth in regular order and close contact.

Figure 2 represents the mouth of a young lady of fifteen. The arch is capacious, and the articulation of the masticating teeth would have been good but for the fact that she had worn some badly-adapted regulating plates before she came into my hands, which had permitted the last molars to elongate.

The six front teeth in both jaws were crowded and irregular, and the lower lip had an undue prominence. My study of the case brought the conclusion that if the lower teeth were all brought into line the arch would be enlarged and the deformity of the lower lip increased; if, added to that, the upper teeth were all advanced over the lower ones, the mouth would be made very ugly. The treatment left the upper teeth without change, except to bring the laterals into line, and the prominence and irregularity of the lower teeth was corrected by the extraction of the right central incisor and bringing the others into line. The result was a perfectly even row of teeth, and no one would notice the loss of the incisor except by a studied observation.

FIG. 3. (Case III.)



My third example is that of a young lady of small stature and spare face. The model shows large teeth, a narrowed arch, but with good articulation. But on the upper jaw the canines are crowded completely out of line, while on the lower jaw there is a generally jumbled position of all the front teeth. Believing that both the narrowed arch and the crowded state of the teeth were abnormal conditions, the superior arch was expanded sufficiently to bring the teeth into line. It then became apparent that while one deformity had been removed a new one had been created. The expanded dental arch was a disfigurement. It was out of harmony with the external features. The mouth, when opened, gave the appearance of "too much teeth." The continuation of that treatment was abandoned; a bicuspid was taken out on each side, and the irregular teeth were brought on to substantially the same line as before treatment. The articulation of the masticating surfaces was preserved, and the expression of her mouth followed her family type.

My fourth illustration shows a very irregular arrangement of the six front teeth of the upper jaw, involving also four others. The irregularity of the six front teeth is manifest at a glance; but the bicuspids were also mal-posed, being inside the proper articulation of the lower teeth.

No teeth were extracted here for regulating purposes,—the first molars were removed because they were badly decayed, their pulps exposed and diseased. Appliances were used, and in exactly eight weeks from the commencement of the work all the teeth were brought into perfectly regular arrangement.

Fig. 4. (Case IV.)

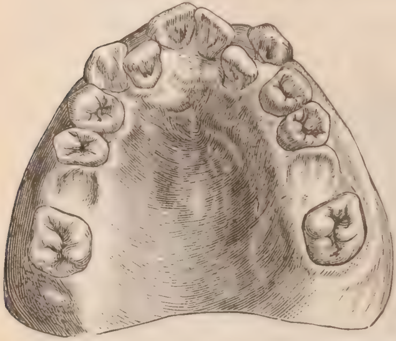
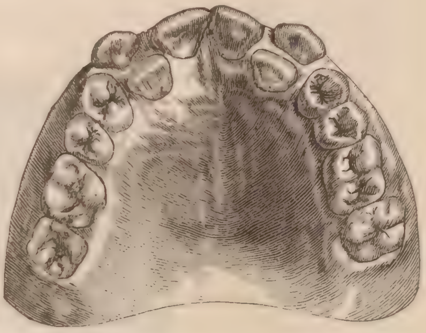


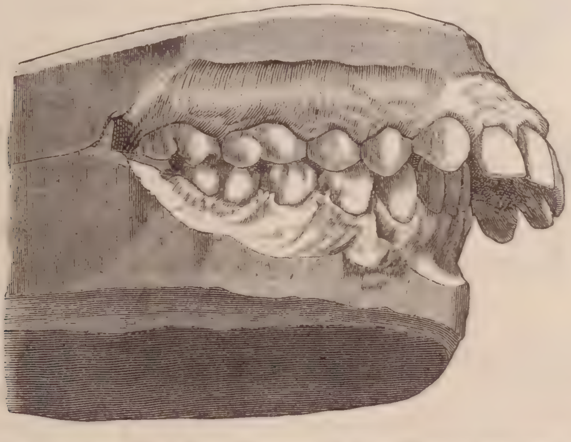
Fig. 5. (Case V.)



My fifth example shows a condition so nearly like the last that only a long experience and a very deep insight into the future could have suggested a different treatment. Such a judgment I did not possess. The case called No. 4 was that of a Miss about thirteen years of age. The case now under consideration was that of a lad of the same age. The course of treatment attempted was substantially the same, varied, however, continually, as the means employed failed to produce the full result expected. I gave this case my undivided consideration, but instead of producing a satisfactory result in eight weeks' time, it was more than eighteen months before I ceased giving it active attention. In the mean time, I had been on the verge of sacrificing the very organs I was attempting to preserve. I had seen both lateral incisors loosen and elongate more than half the length of their crowns,—so loose that I feared they would drop out,—and their preservation was so apparently impossible that I suffered in advance all the mortification of a failure; but they were retained and driven back to their position by appliances, and ultimately the result was a regular arch, all the teeth in line without elongation or loss of vitality. But I am firmly convinced that what I ought to have done in the beginning was to have *extracted the lateral incisors*, when the canines would have dropped into line without extraneous aid.

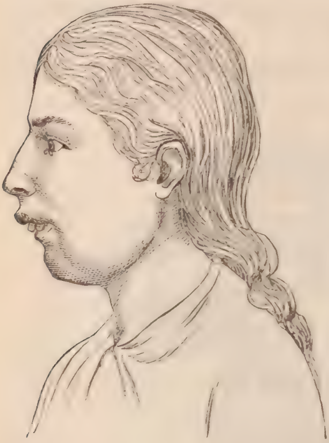
My sixth and last illustration is the case of another Miss of about the same age. This presentation is entirely unlike any of the preceding ones. The upper incisors are exceedingly prominent, while the lower jaw is excessively retreating or under-hung. This discrepancy in the relation of the jaws is seen in the model of the case, Fig. 6, and also in a cast of the profile herewith exhibited. This case was brought to me by a gentleman ot excellent attainments in our profession, and I made an appointment to examine the patient and form a plan of treatment. After a careful study, I came to the conclusion to extract a tooth on each side of the upper jaw previous to the reduction of the anterior prominence. The necessities of such a removal were clear in my own mind, and the step was delayed only as a matter of convenience. In the mean time I made the models here illustrated, and continued my study of the subject from the models. The result of which was that I saw that extraction was not indicated, that it could do no good, but, if done, would produce positive harm. What was required was a little widening of the arch, a flattening of the superior incisors, and a "jumping of the bite;" and the extraction of a tooth could in nowise contribute to such a result.

FIG. 6. (Case VI.)



I have brought forward these six examples to illustrate the following points, viz.: Every case of considerable irregularity of the teeth shows peculiarities which make it differ from every other one of similar aspect. A diagnosis and a prognosis cannot be made without giving the case more study and more reflection than has usually been deemed necessary. An opinion formed by the most experienced observer on a cursory examination may be changed upon a more careful study of the features, the family type, and the model of the teeth. I desire to call especial attention to this point, that a correct opinion can rarely be formed from the models alone. I am constantly called upon to indicate a line of treatment for a patient whom I have never seen, and the only basis given me being some very crude models sent by mail with little or no explanation.

Fig. 7.



It is not always advisable to attempt to change the expression of a mouth where the condition is an inherited peculiarity, a part of the family type, and where the change would involve very prolonged effort, possible breaking up of a good articulation of masticating organs, and with the knowledge that nature will be constantly making an effort to return to the hereditary type.

In patients who have by inheritance small features and small jaws with large teeth, and a tendency to overlap or to be crowded out of line, the extraction of a pair of teeth is indicated rather than the enlargement of the arch.

Cases are of frequent occurrence which show that a pair of any of the teeth in the mouth may be removed to correct an irregularity, excepting the canines of both jaws and the superior central incisors. It would be an inconceivable case which would justify the extraction of the superior central incisors, but the upper lateral incisors and any pair of the lower incisors may be removed, in certain cases, without serious detriment to the appearance of the mouth.

It is not necessary to the contour, symmetry, or harmony of the features that every one of the masticating organs should be retained in the mouth.

In the treatment of irregularities, the comfort and permanent good of the patient is secured in larger measure by not moving organs that are not themselves offending members. It is often better to extract a mal-posed tooth than disturb a whole arch to bring it into line. In such cases as are represented by my fourth and fifth examples, other things being equal, the question of sex should make a factor of the prognosis. The fourth illustration was of the mouth of a young lady with regular, handsome features. The extraction of both the canines or both the laterals from the upper jaw would have left the arch full of teeth, but the deficiency would likely have been observed, and would have marred her beauty all her life. In the fifth example we find a lad likely to grow up with strongly-marked features and, quite possibly, a hirsute covering, which might hide the mouth completely. The articulation of the masticating organs being good, the dental arch being broad enough for distinct enunciation of speech, there remains but slight objection to the removal of the lateral incisors; and when the alternative is the risk to all the teeth involved in bringing them into line, the weight of the argument is in favor of removal.

In a former part of this paper I have alluded to the social status of the patient as influencing the treatment of irregularities. In a purely scientific view the social standing of the patient can have no weight; but in the conservative view proposed by this paper, the present and probable future position of the patient must necessarily influence the treatment. The children of a charity hospital may be largely benefited by a limited and comparatively inexpensive treatment, while such a course would not be justified if applied to the daughters of refinement and exalted social standing.

Adjourned.

PENNSYLVANIA ASSOCIATION OF DENTAL SURGEONS.

REPORTED BY THEODORE F. CHUPEIN, D.D.S.

At a special meeting of the above society, held at the new college building, corner of Twelfth and Filbert streets, Philadelphia, on the evening of June 11th, the routine business being concluded, Dr. W. H. Trueman read a paper, entitled "Why do Fillings Fail?"

Before the reading of his paper, the essayist presented for inspection a very minute tooth-mirror, rather smaller in circumference than a green pea, which he had had made for the more careful examination of pulpless teeth. From its size he was enabled to pass it within the cavity of decay in molars, and by its aid, with suitable instruments, to more effectually remove all *débris* from the roots of such teeth.

He also spoke of experiments he had made for bleaching discolored teeth, and regarded most favorably the action of hydrochloric acid for this purpose. It was alike effectual in removing the stain left by amalgam fillings, as well as the infiltration of coloring matter from dead pulp left within the tooth. He applied it of full strength with a gold or platinum wire, with the rubber dam applied over the tooth, and sealed up the cavity with an oxychloride of zinc cement. The action was very prompt, not requiring more than a few minutes.

The paper of Dr. Trueman was the result of considerable thought and practical experimentation. He had constructed or cast some teeth of zinc, into which copper wire was riveted to illustrate tooth-bone and gold fillings. These he subjected to electrical tests according to the deductions arrived at by the experimenters in the school known as "The New Departure." As the result of his experiments, he had concluded that the "New Departure" is a failure, so far as its assumption that gold is incompatible with tooth-bone is concerned.

He presented numerous specimens—many of them with their histories attached—in which gold and amalgam had both failed, and others where gold and amalgam had both preserved the tooth.

He referred to an occasion, some fifteen years ago, when Dr. Flagg, strongly advocating Morgan's plastic gold, asserted that an ordinary cavity could be filled with it in *less* than *two* minutes. He did not think such fillings a fair test of the value of gold as a filling material.

He was not disposed to attribute failure always either to faulty manipulation, or to material employed. He was unable to account for that part of the "New Departure" which said gutta-percha was a leaky filling, when by experiments in his hands it had proved perfectly moisture-tight, resisting effectually the ingress of the aniline fluid. He had observed, it is true, a very slight stain of the aniline fluid, where these fillings were introduced into teeth with a view to this test, while the floor of these cavities, though exhibiting no positive stain, presented a roseate hue, but this was attributed to the penetrating or searching character of the fluid, which might have found ingress either through the dental foramen or the tubuli of the dentine. He therefore felt warranted in pronouncing it a moisture-tight filling.

He spoke of the great care which those dentists who use the electric mallet should observe in filling teeth with this instrument, and exhibited a case where a tooth had been battered and powdered, by permitting the serrated parts of the plugging points to come in contact with the tooth-bone, not having a sufficiently thick layer of foil before the plugging point of the instrument, which might account for failure. He stated, however, that in the specimen he exhibited of the action of the electric mallet, he had purposely allowed the point to come in contact with the tooth so as to observe the effect, and by this, caution those who might use it carelessly.

The essayist was not prepared to answer the question which the paper propounded, but submitted it for discussion.

The meeting accepted the paper, but was not then prepared to discuss it.

Dr. Buckingham said that so far as the bleaching power of hydrochloric acid went, he had his doubts. The discoloration of decaying teeth is due in a great measure to the free carbon that is left in the cavity during the process of decay; on this hydrochloric acid would have no effect, as this acid has no affinity for carbon though a strong affinity for tooth-bone. He said, however, that if good results could be produced with this agent, it was well to use it despite the negative teaching in regard to its chemical action. He spoke against the indiscriminate use of amalgam as a filling material, yet admitted its occasional utility and service. He thought all amalgams were very much of the same formula and could be manufactured at a trifling cost, and that the high price charged for this or that brand was only the efforts of manufacturers to praise their material at the expense of the consumer. He said they would all discolor, and this was due to the silver or copper they contained, particularly the silver, in proof of which he instanced how silver plates, for the support of artificial teeth, would blacken in the mouth despite the greatest care or cleanliness of the wearer.

Dr. Githens said that the best amalgam he had ever used was a silver coin filed up with a very fine file, the small portion of copper it contained being sufficient to make it amalgamate freely with the mercury. While he condemned it generally, he did not know at times how he would do without it.

Dr. Chupein said that there was to his mind a very great difference in amalgam, some being made to sell, others to use. He thought that failure with it was often due to the material, but quite as often to the careless manner of using it. It must be admitted an inferior filling material to either gold or tin; yet in the use of it dentists generally did not take as much care to prepare the cavity for its reception, or to keep the cavity dry for this, as they did for gold or tin. He believed if given fair play it would not be found wanting. He invariably used the rubber dam for *all* fillings, and smoothed the borders of *all* cavities. When he used amalgam he never finished up the filling on the same day it was inserted. When the patient returned to have these fillings finished up, he invariably observed that they bulged or protruded from the cavity, and in proximate fillings this condition existed to such an extent that an excavator would easily hook or catch on it; this he smoothed down with corundum points, wheels, or disks, according to the locality of the filling, and then polished up with pumice-stone on leather wheels, points, or disks. When thus treated, he had found it a reliable filling, with the margins well defined and remaining smooth. For soft teeth he gave it decided preference over gold, and did not limit its use merely to large cavities or excessive decay. Though not an advocate of amalgam, he was forced to admit its usefulness in many cases where gold had failed in one-fourth the time after its insertion. He would not advocate its indiscriminate use, as he believed such advocacy would lead to a careless mode of operating with many men who were too indolent to give even this material a fair trial.

Dr. Huey said he uses amalgam occasionally, but he never is able with it to obtain a smooth margin. He uses the electric mallet with a light blow to insert amalgam fillings, and in cases of very large cavities encircles the tooth with a suitable matrix.

MASSACHUSETTS DENTAL SOCIETY.—SEMI-ANNUAL MEETING AT WORCESTER, JUNE 6th AND 7th.

The summer meeting of the Massachusetts Dental Society was attended by some forty or fifty gentlemen, in the parlors of the Bay State House. Most of the business of this society is transacted at its annual meetings in December, leaving the sessions of the semi-annual meetings comparatively free for the presentation of papers and discussion of various matters of interest to the profession.

Dr. T. H. Chandler, of Boston, read a paper on "Thumb-Sucking," in which was considered the habit; its deforming effect, illustrated by several models; the cure,—a loose night-dress without sleeves, covering the arms, yet allowing them free movement, but preventing the hands from being raised to the mouth; hereditary transmission of the habit, and also of the deformities of which it is the cause.

The discussion brought out the description of many cases where serious results followed, when the habit had been long continued of sucking the thumb, finger, lip, or tongue, and strongly emphasized the importance of instructing parents in regard to its harmful influence, and insisting that the habit be broken up whenever found.

Hereditary transmission proved a fruitful field for discussion, from which, however, it would be difficult to cull anything particularly new or instructive.

A paper on the "Production of Secondary Dentine for the Protection of Pulps," by Dr. G. F. Waters, of Boston, presented some novelties in the way of treatment, and surprising results. Dr. Waters makes use of *bisulphite* of soda, carbolic acid, aromatic sulphuric acid, vaseline, etc. After preparatory treatment, the space in the pulp-chamber, if part of the pulp is gone, is filled with vaseline, or, if the pulp is intact, it is well covered with vaseline and the remaining portion of the cavity filled with oxychloride of zinc. The tooth should be examined often to see that the oxychloride does not become dissolved away, thereby causing a fresh exposure before the deposit of bone is sufficient to protect the pulp. Dr. Waters reports that he has seen cases where, in a few months, the entire space occupied by the vaseline has been filled in with secondary bone.

Before reading his paper, Dr. Waters made some general remarks upon the alkaline treatment of burns. At the June meeting of the society last year, to illustrate this treatment and show his faith in it, Dr. Waters burned his wrist severely by saturating a sponge with boiling water and placing it on his arm until the flesh was thoroughly scalded. He then covered it completely with bicarbonate of soda (common cooking soda), wetting it with cold water often enough to keep it in a pasty condition. Dr. Waters stated that he experienced no inconvenience whatever from this burn, but attended to his business as usual. It is necessary, especially if the burn is a dry one, to keep the soda moist, and, when possible, the affected part should be elevated so that the blood may gravitate from the wound towards the heart. Several gentlemen spoke of having seen this remedy tried. and with the best results.

Dr. C. H. Osgood, of Boston, related the case of a gentleman who was attacked by severe pain in the region of the angle of the lower jaw, accompanied by great swelling. He was treated by the most noted physicians in the country, who applied poultices to the number of over a thousand, lanced the parts several times, which discharged an enormous amount of pus, and, finally, advised the removal of that portion of the jaw. The man, who was naturally robust, became exceedingly emaciated, and fears were entertained that the case might terminate fatally. After examination, Dr. Osgood was convinced that an unerupted wisdom-tooth was the cause of the trouble. He was laughed at, however, by the surgeons having the gentleman in charge, and it was several months before he could persuade the patient that this was the probable cause of his disease. He was finally permitted to attempt the extraction of the tooth, and, after several trials, was successful in removing a fully-developed *dens sapientiæ*, the crown of which was almost entirely covered with nodulous tartar. The tooth was exhibited. The recovery was rapid and complete. The flow of pus, which had been uninterrupted, ceased with the removal of the cause, and nothing but the scars and depressions caused by the lancing and the breaking down of so much tissue, remain of what came near being a most serious affair.

Dr. C. G. Davis, of New Bedford, read a paper giving "Twenty Years of Retrospect." The essayist opened with an account of his undoubted faith, when he first began practice, in his ability to save teeth and successfully treat the various dental disorders humanity was heir to. Soon, however, failures began to make their appearance. These were at first attributed to carelessness, and self-denunciation for performing operations with so little thoroughness was heartily indulged in. Renewed exertion in this direction and the most careful manipulation on his part did not, however, make successful operations in every case. The white, soft, and porous teeth would not be stayed at his command in their rapid disintegration. His implicit faith received severe shocks, and began to wane,—there was trouble somewhere. And so there has always been with this class of teeth. Those hard and finely organized could be filled, indifferently too, and with almost any material, and would need little further attention. But the poor, inferior quality of teeth are the ones that have so far baffled all attempts at their salvation.

Mention was made of the advent of new materials for filling, new methods and appliances. Crystal gold, cohesive foil, Hill's stopping, plastic gold, mallet, and rubber dam were each in turn seized upon as being the plank that should bridge the chasm between failure and absolute success. Yet there are failures still. We seem just about to be able to grasp the perfection longed for, but always fall just a little short of it.

The "New Departure" and the success claimed for it by Dr. Flagg was spoken of, surprise expressed at results recorded, and more light on the subject implored.

The essay, though confessedly taking the sombre side of dentistry, was written in a most entertaining and instructive style, glittering with forceful poetical hits and apt quotations, held the close attention of the society while being read, and received generous applause when concluded.

The discussion of Dr. Davis's paper covered almost the whole field of operative dentistry, the "New Departure" coming in for its share. Gutta-percha, amalgam, and tin were each believed to have exceedingly valuable qualities, and should be employed when circumstances indicate their use, but there seemed no disposition to displace gold from the highest place among filling materials.

Dwight M. Clapp, *Recording Secretary.*

ODONTOLOGICAL CLUB OF PHILADELPHIA.

A number of practitioners held a meeting on June 15th, for the purpose of organizing a new dental society, to be known under the name of the Odontological Club of Philadelphia, and elected the following officers:

Moderator.—Dr. Jos. R. C. Ward.
Vice-Moderator.—Dr. Chas. A. Davis.
Secretary.—Dr. L. Ashley Faught.

L. Ashley Faught, *Secretary.*

DENTAL ALUMNI ASSOCIATION, HARVARD UNIVERSITY.

The seventh annual meeting of the Dental Alumni Association of Harvard University was held at the Revere House, Boston, on Thursday, June 27th, 1878. Twenty-five members were present. The following board of officers was elected:

President.—H. C. Merriam, Salem, Mass.
Vice-President.—E. P. Bradbury, Boston.
Secretary.—T. O. Loveland, Boston.
Treasurer.—Edward Page, Boston.

T. O. Loveland, *Secretary.*

WESTERN COLLEGE OF DENTAL SURGERY.

Graduates of 1877–78.—First Session.—George Pelton Holmes, St. Louis; Samuel A. Garber, Tipton, Iowa; David J. Pollock, Sterling, Ill.; Charles F. Konantz, St. Paul, Minn.; Erich Richter, St. Louis, Mo.

EDITORIAL.

PERSONAL.

W. F. Thompson, M.D., D.D.S., late of San Francisco, has sailed for Europe, proposing to locate in Paris and practice dentistry.

Dr. C. W. Spalding has retired from the editorship of the *St. Louis Dental Quarterly*, which periodical is now controlled by Dr. Henry S. Chase.

PERISCOPE.

Dental Abscesses and Fistulæ.—Gentlemen: We have recently had four patients affected either with abscess or fistula consecutive to caries of a tooth, and it will be sufficient to mention them to fix in your minds the principal varieties of suppuration of dental origin.

I. *Suppurated submaxillary adeno-phlegmon.*—The patient who is now in No. 20 shows you a quite common type. She is twenty-four years old, blonde, slightly lymphatic, generally enjoys good health, and has never had any scrofulous manifestation. She is not pregnant, and has never had any children. She knows that she has caries of the second molar of the left side of the lower jaw, and she has sometimes suffered from it, but never enough to decide her to have the tooth drawn, or, what would be better, to have it filled. More recently she has again suffered some pain in it which has prevented her from chewing her food upon that side; then, five days ago, she felt a rounded and painful tumefaction at the upper part of the neck under the edge of the lower jaw, and a little in front of its angle. This swelling increased and was accompanied by a febrile movement which compelled her to enter the hospital.

You found at first a uniformly rounded swelling of the superhyoid region, rosy in color over a great extent, and of a deeper red at one point where the consistency was less than at others. There was heat appreciable by the hand, spontaneous shooting pain, and pain on pressure. The jaws were kept closed by a contraction of the muscles which prevented examination of the teeth.

After a few days fluctuation could be felt; I made as small an incision as possible, about half an inch long, not wishing to cause a large cicatrix. A small quantity of good phlegmonous pus escaped, but there still remained a pasty tumefaction formed by a considerable part of the inflammatory swelling which had not yet advanced to suppuration.

The following days, while the pus flowed from the wound, the lips of which were kept apart by a strip of frayed linen, this swelling diminished and terminated by resolution. To-day, the seventeenth day since the operation, the cicatrice is formed, there is no fistula, the patient can separate her jaws and eat. By placing her before a well-lighted window, I could easily see a carious loss of substance in the second lower molar. As it would be difficult to fill the tooth, I advised the patient to have it drawn, and warned her that if she did not consent she would be exposed to a renewal of the suppuration. But, as she does not suffer, she refused for the present to follow my advice, and I did not urge it.

Permit me now to explain the mode of formation and the course of this abscess, in what points it resembles the others of which I shall presently speak, and in what it differs from them.

It resembles them, first, in its starting-point, which was evidently the affected tooth. I do not mean by that to say that all inflammatory submaxillary abscesses are caused by carious teeth. There are some, and I have shown you examples of them during the year, which are consecutive to an affection of the mouth, others which start from a sore throat, that is to say, they may be caused by inflammation of any of the parts which, like the teeth and gums, send their lymphatic vessels to the submaxillary ganglions. In this case I believe in the dental origin, because it is the most common, and because I found no inflammation in the throat.

It differs in its mode of formation: for, among the phlegmons of dental origin, there are some which, having begun in the periosteum, confine themselves to the neighboring cellular tissue, and sometimes to that which is more or less distant, and the lymphatic vessels have no part in the development. There are others, on the contrary, in which the inflammation first affects one or several lymphatic ganglions and then is propagated to the cellular atmosphere surrounding them, as takes place in other regions, and especially in that of the groin, during the formation of most of the acute bubos consecutive to non-infectious chancres.

It is with this latter form, which you have often heard me designate by the name of adeno-phlegmon, that we have to do here. For the affection did not commence on account of the proximity itself of the tooth, as is the case in phlegmons of periosteal origin; it commenced at a distance in the suprahyoid region, which I also call the submaxillary, there where, you know, lymphatic ganglions are found in considerable numbers, most of which are inclosed within the sheath of the submaxillary gland, and receive lymphatic vessels from the cavity of the mouth, and especially those of the teeth and gums of the lower jaw.* Further, the trouble began by a rounded, rolling, painful lump, like those formed by acute adenitis; then, in a second period, this rolling tumor was found enveloped in a uniform mass, which was the surrounding phlegmon.

This abscess differed, also, from others by its mode of termination. It has left neither fistula nor necrosis. You remember that the day after the incision I introduced a probe into the wound, and that I felt no denudation of the jaw at any point. I should undoubtedly have felt it if the starting-point had been an osteo-periostitis; for, in such a case, the periosteum is almost always destroyed or stripped off, and the naked bone can be felt. The ultimate course corresponded to this examination, for there remained no fistula, such as often persists after denudation, fistula due to the non-reproduction of the periosteum and consequent necrosis of the maxilla.

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* The lymphatics of the gums and teeth of the upper jaw communicate with the deep parotid ganglions.

Events proceeded as follows in this patient. The dental pulp became inflamed about the caries. If I were sure that this pulp has lymphatic vessels, I should say that they had transmitted the inflammation to one of the submaxillary ganglions, and that this inflammation had been propagated to the surrounding cellular tissue, had become phlegmonous, and taken on the suppurative form.

But there is here a *nescio quid* which often intervenes in pathogeny. Many subjects have carious teeth without having adenitis; many have simple adenites which do not become phlegmonous, do not suppurate, and terminate by resolution. Some indeed, and we have lately had an example of it, have the adeno-phlegmon, but it terminates by resolution instead of suppurating. Now, we are never able to find the particular cause, under the influence of which the inflammation, starting from the pulp of the tooth, transmits to the ganglions an inflammation of one form rather than of another. It is always the question of individual aptitudes, varying with the subject, and with the moment in the same subject; a question which is surrounded with obscurities which render it everywhere insoluble.

Next, to admit a starting-point in a lymphangitis of the pulp of the tooth, we must be certain that lymphatics exist in this pulp. As for myself, I have never seen them, and I do not know if others have seen them. M. Sappey, the most competent of our anatomists upon this point, does not describe lymphatic vessels of the teeth; he mentions only those of the gums, and, according to him, those of the lower jaw empty into the submaxillary ganglions, those of the upper jaw into the deep parotid ganglions. I admit that I am nevertheless disposed to believe in the existence of lymphatics of the pulp, according to the facts furnished by the clinic. The submaxillary ganglions become painful so easily and so promptly after caries of the lower teeth that it seems to me difficult to explain without a lymphangitis originating in the pulp. If it is not the latter which is at fault, it must then be the lymphatic network of the alveolo-dental periosteum, which is better demonstrated, I believe, than that of the pulp; or, perhaps, it is that of the gum to which the affected tooth may have transmitted its inflammation; but I should then be surprised to see so often submaxillary adeno-phlegmon without appreciable gingivitis.

And, since the occasion has presented itself, I point out to you another peculiarity. We very rarely see adeno-phlegmon caused by affections of the upper teeth. Is it because the lymphatic network, either of the pulp or of the alveo-dental periosteum, is too small? or is it for some other reason? I do not know.

But let us return to the practical standpoint. My principal object in insisting upon this subject has been to make you understand, gentlemen, that, among the abscesses of dental origin, there are some which are not followed by denudation, necrosis, or fistula, and which may get well without removal of the tooth which caused the affection.

For, if I advised this woman to have her tooth drawn, it was not to cure the abscess or its consequences; it was only to protect her from a return of the same trouble, or from another of the same kind.

II. *Subgingival dental phlegmon and abscess of the upper jaw.*—You saw yesterday at the consultation a man who had had pain for several days about one of those fragments of a carious molar which we call stumps, and in whom a painful swelling of the gum over this stump had appeared. As the swelling of the gum was tense and distinctly fluctuating, I at once cut it, taking the necessary precautions not to wound the lips with the blade of the bistoury while doing so. I opened it freely, because wounds of the mouth have a great tendency to close too soon, and there was reason to fear, in case cicatrization took place before the occlusion of the pouch, that the latter would again fill up.

The pus which escaped was mixed with blood and had a fetid odor, which is quite common in abscess of the cavity of the mouth.

This abscess resembles, by its origin, the one previously described. It was certainly an inflammatory process, starting from a carious tooth, that caused it. But with respect to its position, it differs in two ways: first, it was not developed so far from its starting-point; and, secondly, it did not begin by the lymphatic element. In this connection I wish to remind you of one remark: dental adeno-phlegmon arising in the lower teeth is not rare in the lower jaw; we see it arise much less frequently from the upper teeth. When caries of the latter gives rise to it, the inflammatory swelling ought to appear in the parotid region. But the clinic has not enlightened me very much upon this subject, because, in the rare parotid adeno-phlegmons with which I have met, with the exception of one case in which it was certainly due to caries of an upper wisdom-tooth, I was never able to determine positively if the starting-point of the initial lymphangitis had been in the teeth or in the mouth.

In this case it is probable that the inflammation starting from the affected tooth first gained the alveo-dental periosteum, then the external periosteum, and the cellular tissue between it and the mucous membrane of the gum. It is then a subgingival and periosteal phlegmonous abscess. It is, however, possible that the pus may have formed under the periosteum, and that consequently the abscess has been subperiosteal. This is all the more probable because, after having made the incision, I passed in a probe and found part of the upper maxillary bone denuded. Still, I do not know, and fortunately it is without much importance, whether the periosteum has been destroyed, because the abscess formed below it, or consecutively to the suppuration of its outer surface. It is the same here as in acute subperiosteal abscesses of the large long bones; we know that periosteum disappears or is stripped off in consequence of these phlegmasiæ, but we do not know exactly which of these lesions has been produced, nor, above all, what has been the course and the succession of the phenomena.

The denudation warned us of one thing, that necrosis was possible. I say possible, and not certain, for in such cases we sometimes see the bone cover itself again and continue to live. But if the decayed tooth remains in its place, it causes another abscess after a certain length of time, a new denudation, and, if the necrosis does not then take place, it does on the third or fourth attack. It is to be remarked, moreover, that in these cases of gingival abscess the necrosis is generally limited to a circumscribed point of the alveolus, and is never very extensive; and that at the same time the concomitant osteitis does not become hypertrophic in the neighborhood, as you know that it does in the long bones.

What will this abscess become? If the osteitis is not yet necrotic it will close, and everything will resume the condition in which it was previously; that is, the patient will keep his stump and will almost inevitably have the relapse of which I have spoken. If, however, necrosis has already occurred, and elimination must take place in the form of dust or of a splinter, suppuration will be kept up and the fistula will last until this result is obtained; now this does not take place, or at least it is not definitive, until the affected tooth has been removed from its cavity, a process which is always slow when it goes on spontaneously. We have recently seen at the consultation a woman who has had for nearly a year a fistula of this kind (gingival dental fistula) kept up by a very limited spot of necrosis on the lower jaw corresponding to a carious and loose canine tooth.

These fistulæ, which are very common, are not serious; but they keep up an unclean and inconvenient suppuration in the mouth.

To relieve the patients of these inconveniences,—return of the abscess, slowness of elimination, and persistence of the fistula,—there is only one useful advice to give them, and that is to remove the tooth or the stump which is the cause of the trouble. Whether it be that the operation itself removes the necrosed alveolar portion, or that the opening of the alveolus prepares an easier way of elimination, it is none the less true that after the removal of the tooth the suppuration and the fistula, if there is one, disappear promptly. I have given this advice to our patient, and he has followed it. The root of the carious tooth has been removed, and I consider the recovery assured.

III. *Cutaneous dental fistula kept up by the second upper molar on the right side, with a callous band between the fistula and the tooth.*—In connection with the preceding case I spoke of gingival, and consequently intra-buccal, fistulæ consecutive to abscesses starting from decayed teeth and the alveolo-dental periosteum, with imminence of necrosis. But it happens sometimes that abscesses of this kind, instead of projecting simply under the mucous membrane, open through the skin and cause cutaneous fistulæ which are much more disagreeable to the patients, since they occasion an ugly deformity. You will meet with these osteo-periosteal abscesses followed by cutaneous dental fistulæ upon the upper jaw as well as upon the lower. In the first case they open upon the cheek, in the second upon the outer face of the lower jaw. Generally the concomitant necrosis is still very limited and will promptly disappear after removal of the tooth, removal which will always be the principal means of treatment. But in some exceptional cases, the necrotic osteitis having spread very far, you will have a more extended and slower necrosis, the elimination of which will only take place long after the removal of the carious tooth.

In the case which we have just seen at No. 6, ward Sainte Vierge, the cutaneous dental fistula is made remarkable by the existence of a very hard callous band which cleared up the diagnosis, and by the opposition which the prolonged contracture of the muscles which close the jaw offered to the examination of the teeth and the necessary removal of one of them.

It is a man 33 years old, very subject to toothache, who seems to have had gingival abscesses on several occasions. Seven weeks ago a new abscess opened spontaneously on his left cheek in front of the masseter and at the outer portion of the canine fossa, and remained fistulous.

You saw that the orifice, depressed in its center, was surrounded by vegetations, and that it yielded a small amount of serous pus. This liquid was not as limpid, and did not flow in as large quantities when he was eating. as it would if it had been a salivary fistula. A probe introduced into the fistula passed towards the upper jaw, and although I strongly suspected necrosis I did not find the characteristic hard and sonorous point.

The fistulous canal was about an inch long. By placing a finger in the mouth upon its course, I felt an elongated induration, which certainly corresponded to it. Seizing the cheek between the thumb and forefinger, one of them being placed within the mouth, the other upon the skin, I still better appreciated the elongated, hard, evidently callous cord, extending from the cheek towards the hindermost part of the upper alveolar arch. I called your attention especially to this callous cord; I told you that it was found almost always in cases of cutaneous dental fistula, that it was not very appreciable when the course was short, but that it was much more so when it had a certain length. I added that it was a great help to the diagnosis, because it indicated the certain existence of a carious tooth and necrosis, and the point where these lesions were to be found.

This double indication was all the more precious in our patient, because the probe did not reach the necrosed bone, and the exploration of the mouth was rendered impossible by the constriction of the jaws. This constriction, which is seen rather during the acute period of dental phlegmons than during the chronic and fistulous period with which we have to deal here, is more often met with when the last two teeth are involved than when the others are. In the absence of certain signs, all the others—the existence of a callous tract, its direction towards the posterior portion of the upper alveolo-dental arch, contraction of the muscles—united to make me believe in the existence of an alveolo-dental lesion corresponding either to the wisdom-tooth or the second upper molar.

The indication was precise: to open the mouth, examine, and remove the tooth that was found to be affected. I should have temporized if the inflammation had still been in the acute state, for, at such a time, the attempts to separate the jaws by force sometimes cause an exacerbation of the phlegmasia, and, moreover, it is difficult to succeed, because the muscles are too firmly contracted. But in this case there was no acute inflammation, it was probable that the resistance was not great, and it was necessary to prevent the contraction, which was still curable, from giving place to an incurable retraction.

That is why I first took a spoon and passed its handle, on the flat, between the two rows of teeth, and then tried to turn it on its edge, so as to separate them. I did not entirely succeed, but I obtained a separation of a few lines. I told the patient, who for some time had been able to eat nothing but soups, and was anxious to have the functions of his jaw restored as quickly as possible, to use the spoon in the same way, five or six times during the day.

The next day I found the separation a few lines larger, and then substituted for the spoon the conical screw of boxwood, which I first introduced myself, so as to show the patient how to use it. At the end of three days enough separation had been obtained to allow me to discover, with the aid of a dental mirror, a deep caries behind the second upper molar, which was a little loose, and whose alveolus suppurated. I did not see the point which was necrosed, but the intra-alveolar suppuration left me no doubt of its existence.

The tooth was then drawn. Four days afterwards the cutaneous fistula closed. To-day, the callous tract commences to grow smaller, and I count upon a definitive recovery.

IV. *Submasseteric phlegmonous abscess of dental origin. Necrosis of the lower jaw.*—Gentlemen, a young man, 23 years old, who was for a long time in No. 43, ward Sainte Vierge, and who returns to consult us from time to time, came to see us again this morning. On examining the interior of his mouth, I found, in place of the second molar of the right side of the lower jaw, which I had removed two months ago, an alveolar cavity full of pus, with a denudation and sonority of the whole cavity and of the internal and external faces of the maxillary bone, over a surface of about one-third of an inch. There is then necrosis, but it has been preceded by a peculiar variety of abscess, of which I will now recall the principal details.

When he entered the hospital, about two months ago, this young man had had for seven days a painful and quite hard swelling of the right cheek, without redness and with a little fever.

He was unable to open his mouth, on account of a prolonged contraction similar to that of the preceding patient. At first I was not able to determine the condition of his teeth. But I felt with the finger a few asperities and inequalities upon the crown of the first and second molars of the lower jaw; I had, moreover, recognized that the wisdom-tooth was well out, and that consequently this was not of those affections which are sometimes caused by the difficult and laborious evolution of that tooth. Examining as well as possible the posterior portion of the entrance to the mouth, I saw pus flow from the neighborhood of one of the last molars, and I thought that it was a deep gingival abscess, the opening of which announced the approaching termination in a definitive cure or in necrosis. Still there remained a considerable swelling of the region of the masseter, and pressure exerted upon this region caused a good deal of pus to flow from the opening in the gum. We had then a deeper and more extensive abscess than those which we ordinarily see open in the neighborhood of the gum, and I had to suppose that the spontaneous opening was not sufficient. Not only was it not sufficient, but it even closed in a few days, and then the swelling became greater in the region of the masseter and advanced evidently towards the temple. Then deep fluctuation became apparent in the first of these regions; I then made a transverse incision an inch long, parallel to and below Steno's duct, and also parallel to the principal branches of the facial nerve, some of which I should certainly have cut if I had carried the bistoury vertically. I divided, layer by layer, the skin and the whole thickness of the masseter, and it was only when the deep face of the latter had been divided that we saw a large amount of fetid pus escape; pressure exerted upon the temporal region, which was tumefied even then, did not cause pus to flow from the opening, thus proving that the phlegmon, although propagated to that region, had not yet suppurated there. The probe introduced through the wound reached the outer face of the branch of the inferior maxillary bone, but did not allow me to detect any denudation. After this operation, the pouch, which was kept open by means of strips of frayed linen, emptied itself little by little, the temporal swelling disappeared, and the jaws could be opened, thanks to the aid of the conical screw. Meanwhile, the opening in the gum was re-established, and suppuration persisted on that side, while it ceased and cicatrization took place in the cheek.

What was there peculiar in this patient, and in what did his dental abscess differ from those of which I have already spoken? It differed in this, that, starting from an affected tooth and in its alveolus, the inflammation was propagated along the periosteum, as in gingival phlegmons; but instead of stopping in the gum, or burrowing in the submucous and subcutaneous cellular tissue, it made its way along the outer part of the jaw as far as the deep face of the masseter, and farther to the sheath of the temporal muscle, moving along the coronoid process to the outer and perhaps the inner face of this muscle. The phlegmon thus propagated became submasseteric and temporal, although I cannot say whether, at this latter point, it was subtemporal or was limited to the connective tissue placed between the muscle and the aponeuroses. Then the submasseteric abscess formed, and, at the same time, the temporal portion of the phlegmon terminated by resolution. Finally, the submasseteric abscess terminated without fistula, and without necrosis of the branch of the maxilla. Only the portion of bone adjoining the carious tooth necrosed. We recognized, afterwards, that this affected tooth was the second lower molar, and we removed it.

This was not the first time I had seen deep temporo-submasseteric phlegmon follow dental caries. In two of my private patients the suppuration invaded not only the submasseteric portion, but also the subtemporal portion of the phlegmon. I considered it necessary to make two incisions, one through the temporal, the other through the masseter muscle, and to pass a drainage tube from one to the other, in order to assure the evacuation of the collection. In one of the patients, the incision of the temporal muscle occasioned a flow of arterial blood, which rendered a rather laborious ligature necessary. Both patients recovered without necrosis of the branch of the maxilla, and did not even have the alveolar necrosis which we observed in our last patient.

Things did not pass so happily in a man whom I treated at La Pitié, in 1867. After the submasseteric collection had been opened, purulent infection occurred and caused death. I did not find the maxilla denuded to a very great extent, nor its parenchyma in suppuration; the purulent infection seemed to me to have been caused by septicæmia consecutive to the decomposition of blood and of pus in the deep pouch.

The possibility of this complication authorizes me to tell you that the indication in abscesses of this kind is to open early and freely, and in both regions (of the masseter and temporal), when fluctuation can be sent from one to the other; in one alone, the first, when the collection remains exclusively submasseteric. Stagnation, and consequent decomposition, of the pus in the bottom of the foyer must be afterwards avoided by means of repeated washings.

As for the patient, we have only to wait for the elimination of the necrosis of the lower jaw, which is more extensive than usual, but still quite limited, and to advise frequent washings of the mouth, so as not to allow the pus to be swallowed.—*Gosselin's Clinical Lectures on Surgery—Medical News and Library*, May, 1878.

Retention of Fractured Maxilla.—Fractures of the inferior maxilla are far more frequent than those of the upper maxilla. Some of these fractures are right difficult to reduce and retain in position, while in many cases the deformity is slight, and retention in position is easily accomplished. Hence a double cause for the number and variety of appliances used in practice. Some are quite ingenious, and difficult of application; others are very simple and easily applied.

In two cases of fracture—the first, fracture of the superior maxilla, just released from treatment, the second, of the inferior maxilla, yet under observation—india-rubber rings, made of narrow sections of rubber tubes, and passed over the neighboring teeth, served the purpose of retention admirably well.

The first occurred in a French Creole, twenty-six years of age, who, in an unsolicited bull fight, was knocked down, and though a fallen foe, was stamped in the mouth by his cowardly adversary. The right superior maxilla was fractured. A section of bone about one and a half inches square, including the alveolar process in front and a part of the hard palate, was so displaced as to make an ugly deformity.

The piece of bone was adjusted, and retained in place by a couple of rubber rings for twenty-five days, when the union was complete.

The second case is that of an Irishman, thirty years of age, who entered a surgical ward in the Charity Hospital on the 16th of August, 1877, with a double fracture of the inferior maxilla, caused by a blow with a brick-bat. One fracture occurred about an inch to the right of the symphysis, the other just in front of the left angle, both compound and comminuted. The tendency to displacement was hard to overcome, the application of an external splint with a bandage closely applied, and the suturing of the teeth with the largest size silver wire, proving inadequate.

Graduated rubber rings, made of sections of tubes of different sizes, were passed over the first, second, and third teeth from the seat of fracture, which held the loose section of bone firmly in place. A pasteboard splint, with a four-tailed bandage, was also applied. This dressing was made one week after the injury. One month after the injury, union was still incomplete, and fragments of necrosed bone were removed. Perhaps a more artistic appliance to such a fracture would not have secured a better result. Even in this exceptionally bad case, the efficiency of the rings was clearly shown.

The elasticity of the rubber rings is sufficiently powerful to overcome any muscular contraction which might tend to disarrange the parts, and constantly keeps the fractured edges of bone in close approximation. Indeed, a force too strong may displace the teeth, especially those next the seat of fracture.

Now, we do not urge the substitution of these rubber rings, in all cases of fracture of the maxillary bones, for the more admirable contrivances which we have at our command, such as the interdental splint of vulcanized rubber. We are very often forced to utilize what we have, in the absence of what we need. A great many fractures, even of the lower maxilla, are very easily held in proper position, and we would only suggest the use of these rubber rings as a cheap and simple device, the value of which we hope will recompense for the space occupied by this article.—*A. B. Miles, M.D., in New Orleans Medical and Surgical Journal.*

HINTS AND QUERIES.

"He that questioneth much shall learn much."—BACON.

CORRESPONDENTS desiring a reply in this department are requested to make use of *distinctive signatures or initials*, and avoid the practice of signing their communications Reader, Subscriber, etc.

CORRESPONDENTS who wish notice to be taken of their communications should authenticate them with their names. We cannot insert queries or replies except they are so accompanied. Names not necessarily for publication.

I HAVE an amalgam plug in good condition, no decay, margins white, tooth-structure medium good, that is sensitive to a nickel-plated mirror or silver spoon,—more marked at the margin of the plug,—but not sensitive to steel in any way, and perfectly comfortable in use; nerve capped with Weston's non-irritant cement. Why sensitive to the mirror and not to the steel?—W. J. N.

WILL some one experienced in dentistry inform me in regard to the following: In making a full upper and lower set, for a normal mouth, should the upper back blocks be placed where the original teeth were, namely, over the ridge, and then incline the lower back blocks in until the teeth antagonize? or should the lower blocks be arranged perpendicularly on the plate, and then bring out the upper blocks off the ridge, in order to make the antagonization perfect?—ZAHNARZT.

WHAT is the treatment indicated when the eruption of the inferior wisdom-tooth causes a swelling and indentation of the gums and adjacent tissues, extending to the fauces and making deglutition painful? In the case in hand it does not seem as though the trouble was caused by want of room.—I.

A YOUNG lady patient complains of the queer noises made by her condyloid processes in their articulations during mastication. What is the cause, and what the remedy?—W. H. H.

AMALGAM.—1st. Is it not generally considered that care is needed to avoid having too much mercury in the plug, lest it should shrink?

2d. What is the best means of knowing, in mixing, the point between shrinkage and crumbling?

3d. Is the point a fine one, or is there considerable latitude in which the plug will be all right?

4th. As to condensing, is it best to have it so soft as to need little else than to press it to its place?

5th. Or should it be so dry as to have a tendency to crumble at first, and become softened by much condensing?

6th. Would not such working injure the crystals in setting, and also injure the perfect adaptation to the walls by disturbing the first relation formed between the wall and plug, and thus increase a tendency to leak?

7th. What is the best rule for condensing amalgam?

8th. Where are found the best instructions for working amalgam? Our text-books are silent.—W. J. N.

IN the DENTAL COSMOS for July appears an article from Dr. G. R. Thomas on transplanting teeth. Will the doctor be kind enough to inform us how long after the transplanting of the tooth before it becomes firm in the socket, so as not to give pain in eating; also how the tooth is held in position until the alveolar walls close around it, the time required for the same, and how long the appliance for keeping it in position is kept on? I am desirous of having the experiment tried in my own mouth, and would like to know how much trouble and pain I will have to experience before the tooth becomes firm in the socket.—O. D. F.

WILL not some one who has been successful in the use of local anæsthetics in the extraction of teeth give the recipe and the manner of applying? I am frequently told by patients that they have had teeth extracted elsewhere by such process without the least pain. I have reference to applications rubbed on, or held on the gums, and not to the "freezing" process.—DIX.

REPLY TO A. R. REED, who, in the June number of the DENTAL COSMOS, asks how to keep moisture out of a labial cavity. I have had much trouble with this class of cases, and will give him the plan I pursue with cavities situated on the labial surface of any of the anterior teeth. I take an impression of the tooth in wax, being careful to get the labial surface of tooth and gum perfect. I then (requesting the patient to call next day) make a cast of the tooth in plaster. I take a broken separating file (the thinnest I can get), anneal, and bend the end to any desired angle, then file out to fit the tooth accurately at the margin of the gum. With this appliance (after applying the dam) I can force both gum and dam above the cavity, holding it in position with the left hand. It is sometimes necessary to dissect the gum from the tooth a little.—J. E. MATTHEWS.

ANSWER TO A. R. REED, in June DENTAL COSMOS.—Place the dam around the two adjoining teeth as usual, pass a ligature of floss-silk, previously well waxed, around the neck of the tooth, as high up as you can tie it in a surgeon's knot first, then in a hard knot. Then insert the point of a narrow enamel chisel with a sharp edge under both ligature and dam; slide the point of the chisel up above the margin of the cavity under the gum; now carry the handle of the chisel out to a right angle with the tooth, at the same time pressing the edge of the chisel hard into the dentine; hold the chisel in position with your left hand and fill with your right, or better, have an assistant hold the chisel. Instruments called gum depressors, invented by Dr. G. A. Bowman, are preferable to the chisel. You will see cut of them in the advertising pages of the June number of the DENTAL COSMOS. By the use of this method I have never failed to keep out moisture in such cases as you represent.—G. B. McDONALD.

REPLY TO A. R. REED, who, in the June number of the DENTAL COSMOS, asks how to keep the moisture from cavities, under the gum, situated on the labial surfaces of centrals.

The easiest manner I have found is to clean out the cavity as much as possible, and then press cotton into it and back under the gum in such a way as to lift the festoon away from the tooth. Crowd the cotton in tight, and then moisten the gum back from the tooth a little way with chloride of zinc, first placing a small napkin under the lip to prevent the moisture running down from above. The chloride of zinc will slightly cauterize the gum adjacent to the cavity, so that no moisture can ooze therefrom, and it remains so dry through the whole operation that the gold may come in contact with it without fear. After the cotton has remained pressed up under the gum a few moments, if properly manipulated, it will leave the margin of the cavity free all around, so that it can be easily prepared for the gold. Of course, the application of chloride of zinc must reach the under surface of the gum, and sometimes it is necessary to crowd a little moistened piece of cotton or bibulous paper between the gum and tooth, to be left through the operation, drying the parts thoroughly with absorbent cotton or spunk. This operation usually leaves the margin of the gum whitened and disfigured (but no more than any other operation in such locality), but with cleansing and the application of glycerine or other soothing remedy it will recover its normal condition in a day or two.

There may be objections to this process, but I have filled many cavities satisfactorily, and with *ease*, when I could not do it any other way—when I could do nothing with the rubber dam.—R. B. TULLER.

ANSWER TO E. CHENERY, M.D., in June DENTAL COSMOS.—Teeth once extracted, and then restored, do have a tendency to subsequent inflammation, especially those from which the pulps have not been removed and the root-canal thoroughly filled to the apex. In the case of your left lower bicuspid, if it was not so treated, I am positive that the recurrence of inflammation in the peridental membrane, after a lapse of five years and a half, was caused by the decomposed remains of the pulp left in the canal. In no case where a tooth, with a dead pulp in the canal, is tolerated in the mouth, even without pain, for any period of time, have we any assurance of one day's comfort; for, like Mount Ætna or Vesuvius, it may shake us to the center of pain and agony without a moment's warning.—G. B. MCDONALD.

H. C. H., in June DENTAL COSMOS, says, "I have, in a practice of over thirty years, extracted teeth for women in all stages of pregnancy, and have never had any trouble." That has been my experience in a practice of twenty-six years. —G. B. MCDONALD.

B. F. S. is referred for answer to his query to Garretson's "System of Oral Surgery," pages 819 to 917. The growth described classifies itself under the head of the epulides, a variety of oral tumors made up of several sub-varieties. To understand the nature, and demanded treatment, of any particular case of epulides requires understanding of the histological place occupied by it in the series. The plan pursued by B. F. S. in the use of caustics, while a very excellent one with growths strictly benign, is very objectionable with such as are malignant. Pressure, however, affording, as it does, support to granulations, is a means of treatment applicable alike to the self-explaining growths and to the neoplasms. While engaged in possessing himself of a scientific appreciation of his case, B. F. S. would find it not amiss to take a wax impression of the parts, and by means of a plate compel solidification, and if possible, proper organization of the spongy mass he is combating.—A. B. C.

REPLY TO THE QUERY OF H. V. concerning the subject of dentition as affecting the health of infants.

The attention of the querist is directed to a paper on the subject by J. W. White, M.D., published in the American Supplement to the *Obstetrical Journal* for April, 1878. That paper discusses clearly and practically the anatomy, physiology, pathology, symptomatology, and surgical treatment of pathological dentition.

The present paper, edited from the observations and experiences of Mr. Caxton, of England, together with some added suggestions from the practice of the writer, will, it is trusted, supplement the monograph of Dr. White, enlarging to some extent outlook upon a subject than which there are few more worthy of close consideration.

The process of teething, as the eruption of the temporary and permanent sets of teeth is termed, is one having as much interest for the pathologist as for the physiologist.

In very many instances it unfortunately happens that advancing teeth excite great irritation and fever in the animal economy, which not unfrequently settle in some one or other of the more important organs of the body, and induce disease, which, if not combated speedily by the resources of medical art, may lead to permanent and irretrievable mischief, or even to the absolute destruction of life. It behooves, then; all who are interested in the welfare of children to watch carefully at this period of infantile existence for the signs and evidences of commencing irritation in any part of the system.

The teeth, as we are aware, develop themselves in the embryo, and continue to grow after birth, until, in the average of instances, the crown in full growth makes its appearance externally, causing, by the pressure it exerts, the removal of all integuments overlying it. The root is not complete until after the crown of the tooth has presented itself above the level of the gum some considerable time.

Before this occurs certain changes take place in the gums, which indicate to the experienced eye and touch that nature is urging forward the eruption of a tooth. The gum becomes broader, swollen, hot, and tender; the child is never easy unless it has a finger or some substance in its mouth to press upon the inflamed gum. Much pressure, however, causes a fit of crying, and the little sufferer in addition presents signs of general irritation and irritability.

In some instances, however, teeth are cut with little or no disturbance of the health, almost the first intimation given that the process of dentition has been going on being the appearance of the organs above the level of the gum.

The first teeth of the temporary set are erupted generally about the sixth, seventh, or eighth month of infantile life; these are the central incisors of the lower jaw, and they are followed in the course of a month or two by the corresponding teeth of the upper jaw. It should be fully understood, however, that in stating the sixth, seventh, or eighth month as the period when these teeth are first seen in the mouth, the average is taken of the process of teething in healthy children. Teeth are frequently erupted much earlier, and again, the process is often delayed till the tenth, and even the twelfth month, the time of their appearance varying greatly in different children, owing to their freedom from disease, hereditary or acquired, the strength of their constitution, etc. Again, some children erupt their teeth irregularly; that is to say, certain teeth appear above the gum in an order different from that usually met with.

In the usual course of nature, however, the central incisors of the lower jaw erupt about the time stated, and their appearance is followed by that of the corresponding teeth of the upper jaw. The lateral incisors of the lower jaw next make their appearance; this occurs about the tenth or eleventh month, and those of the superior jaw soon follow. A month or two subsequently the anterior molars of the lower jaw erupt, and soon after those of the superior maxilla. The canines next [illegible], and lastly, the second molars, between the age of two and two and a half years.

The irregularities so often encountered among the permanent teeth are rarely met with in the temporary, either as regards position, number, form, or date of eruption. The well-known, but perhaps apocryphal tale respecting Richard III., has, however, had its parallel of late date.

Tomes mentions a child, five weeks old, whose mother complained that it was born with teeth in the lower jaw, by which her breast and its own upper jaw had been injured. On examination he found two sharp-edged, rough-surfaced incisor teeth sticking up from the center of the jaw. They were ill-shaped, imperfectly coated with enamel, and loose in the gum, and stood across, instead of in a line with, the alveolar arch. These were removed, and it was found that the roots were not more than one-third developed. In fact, the teeth had attained about the normal amount of development for the age of the child, but had been protruded through the gums before they were fitted for eruption. An after-process had been effected before the preparatory one had been completed.

Dr. Brown, an American physician, mentions a still more extraordinary example, which he published in the *American Journal of Dental Science*. A child was born with the central incisors through the gums. They were extracted. Two other children were born of the same mother; in each of whom the same singular anomaly was found. The teeth of these were allowed to remain. In each case the children were females.

Dr. Crump, another American physician, reports a case of full dentition at birth, in a still-born negro child. The sockets were very imperfectly formed.

Dr. Lethbridge, it is said, has met with a similar instance. The writer has met with an instance of partial dentition at birth.

Imperfections in dentition are of occasional occurrence. Sometimes the central incisors are absent; in others, again, the child has attained its sixth year without erupting any of its front teeth. Two cases have been recorded in which persons have reached old age without the eruption of teeth.

In a case exhibited by Dr. Brinton, at the Pathological Society, the alveolar processes of the upper jaw-bones were wanting, but the canine teeth were present on each side, lying parallel with the maxilla.

I myself examined a child whose mouth was apparently well formed, nevertheless, I detected the absence of the right canine tooth of the lower jaw,—first dentition. This deficiency might easily have been overlooked, as the jaw appeared to possess its full complement of teeth, no vacancy existing where the canine should have been found.

It has been already stated that the irritation caused by the process of dentition may, in many children, induce disorder, and even permanent disease, of other and important organs of the body.

The first signs indicative of perversion are fever and general disturbance. The child is fretful and irritable; the skin hot and dry; the eyes are heavy and dull, or preternaturally bright; the mouth slavers; the gums are swollen, broader, and more red than usual, hot and painful to the touch; the appetite is lost, the little patient taking the breast by fits and starts, and speedily loosing its hold of the nipple. The bowels are generally disordered, the stools often of a pale, pasty appearance, or green, or clay-colored. Frequent purging, with griping pain, is not an uncommon concomitant of dentition. The head, however, may be the part that sympathizes most. When the irritation has been continued for some little time, or even very early during the attack, the infant may be seized with convulsions, recurring often with great rapidity, and ending, not unfrequently, in death, if the appropriate remedial measures be not adopted. Less severe forms of disorder, thus induced, are eruptions on the scalp, cutaneous inflammations, discharge from behind the ears, inflammation of the eyes, etc.

Water on the brain and epilepsy, generally of a temporary, but sometimes of a permanent character, may be thus produced. Again, palsy affecting one or more limbs may be induced, and may become permanent, or even prove the precursor of a fatal termination.

On this point Dr. Henry Davies, late of Saville-row, physician to the British Lying-in Hospital, and now of Brighton, has added his testimony in proof of the very serious diseases which are sometimes set up by pathological dentition. In a communication which he addressed to the Medical and Chirurgical Society, he describes the case of a female infant, rather more than a year old, who had cut two lower teeth well, but who one day, having been previously lively, and having taken her usual exercise in the baby-jumper, and been put to bed apparently well, soon afterwards became restless, with slight shivering. Early the next morning a peculiar cry attracted the attention of the nurse, who gave her some Dalby's carminative. This not affording any relief, she was put into a warm bath, and had a dose of castor oil.

A few hours after she was seriously ill, cold, and blue about the mouth, nose, and eyes. She was then put into a warm bath again, when she appeared to lose the entire use of her limbs, and her countenance became vacant. Dr. Davies did not see her until the evening of the second day, much valuable time being thus lost. She was perfectly conscious; head cool, and the temperature of the surface generally natural, the pupils contracting under the influence of light; pulse moderately frequent, small and languid; tongue slightly coated. The upper extremities were devoid of all power of motion or sensation, even from pinching or pricking with a pin; but the lower extremities were drawn up on the feet being tickled. Nothing unnatural could be detected in the spine or elsewhere. Leeches had been applied behind the ears. A blister was placed between the shoulders, and aperients, etc., were administered. During the five weeks that the child lived no change took place in the paralytic symptoms, and she remained conscious to within a few hours of her death. During this time she had erupted six teeth. The appearances after death showed some degree of determination of blood to the brain, which, with the upper part of the spinal marrow, was peculiarly firm. There was an ounce and a half of sanguineous fluid covering the surface of the brain.

In commenting on this very interesting case, Dr. Davies stated that palsy coming on suddenly, not preceded or accompanied by any apparent disease of the brain, is by no means uncommon in children between the first and tenth years. In all these cases, he believes, and facts fully demonstrate the truth of his opinion, that the predisposing cause is the process of dentition. The exciting, or immediate cause has, he says, in the majority of cases, appeared to be some derangement of the digestive organs. In this case, he remarks that the exciting cause was the succession of shocks received by the spinal cord through the use of the baby-jumper.

This interesting and clinically valuable instance of palsy occurring in an infant bears directly on the statements that have been advanced respecting the dangerous consequences of neglected dentition. If this child's gums had been lanced on the morning she was taken ill, it is more than probable that all the serious symptoms which ensued would have been prevented. That the distress and nervous derangement dependent on dentition were the predisposing causes of the palsy we have the authority of a distinguished physician, who has directed a very wide opportunity to the investigation and treatment of the diseases of women and children. Every fact in physiology and pathology at all bearing on the subject confirms this opinion. The cases yet to be narrated, and the facts which have been already made known, are such as forbid any doubt upon the subject. In the case referred to, warm baths, and aperients, and the application of leeches, were relied on, while the simple, but most efficient remedy, lancing the gums for the removal of the local cause of this mischief, was apparently wholly neglected; at all events, no mention is made of its performance in the record of the case in the medical journal. It is, therefore, only fair to presume that it was not done. In this respect no blame attaches to the medical man, as his assistance was not sought until the domestic pharmacopœia had been exhausted, and the derangement was fully established.

It is much to be regretted that the non-performance of the trifling operation led to the sacrifice of a human life, but it is hoped that the record of the painful results following its neglect will serve to open the eyes of parents and nurses to the folly of which they are guilty in offering a sustained and almost systematic opposition to lancing the gums; a proceeding which has been the means of preventing and removing a vast amount of infantile suffering, and of saving many lives.

Similar testimony is borne by Dr. Marshall Hall, in his work on the "Diseases and Derangements of the Nervous System," in which he has published the case of a little girl, twenty months old, who, while suffering from dentition, lost the power of elevating the right arm; that of closing the hand and bending the forearm remaining. There was not any symptom of brain-affection present. The case was clearly one of palsy from teething. The gums over the four eyeteeth, which were all coming forward, were freely laneed every second day, the bowels well moved, and the diet strictly regulated. For fear of hidden disease within the head, two leeches were applied a few days after the attack of palsy.

The little girl was seized in the night with a fit of crowing inspiration. This confirmed Dr. Hall in his opinion as to the cause of the attack, and the event justified the view he had taken. The child recovered perfectly, without any energetic remedy being used for the cerebral affections, by continued attention to the state of the gums, the stomach, and the bowels; an event, he says, which could scarcely have occurred from such simple measures, had there been such decided affection arising from disease of the brain. The palsy and the cough completely disappearing when the four teeth made their appearance in the mouth.

While entirely agreeing with the authority, it may be well for us to remember that there is a possibility of acting too hastily in lancing the gums. Cases may present themselves having the peculiar hemorrhagic diathesis, in which possibly the consequences might be quite as fatal in lancing as in not lancing. It might be as well to inquire in every case whether or not this diathesis has existence; treatment being influenced accordingly. The extreme cases sometimes presented should impress the advisability of examining the mouth immediately on being called upon to treat diseases of children during the time of teething.

The indications in infantile dentition, as will be inferred, are twofold. 1. In the local relation. 2. In the systemic direction. To meet the first, depletion is demanded. To meet the second, medication is required. To deplete locally does not imply necessarily abstraction of blood. Many children will not endure even the smallest loss in such direction. Hot foot-baths, blisters to the calves of the legs, cold applied to the head and face, sponging the body with alcohol; all these are admirable means as substitutes for the lancet. Where, however, no counter-indications exist to the use of the lancet, the writer agrees most decidedly with Dr. White in esteeming it a very sheet-anchor of safety. Leeches and cups are admirable adjuncts; the cups being dry, or otherwise, used to the back of the neck, with one, or at most, two or three cuts. Dry cups are, however, to be greatly depended upon.

As means to allay nervous and arterial excitability, no medicine, in the experience of the writer, surpasses the bromide of potassium, or a combination of that salt with veratrum viride.

To one or two drops of Norwood's tincture of veratrum viride the writer conjoins five to ten grains of bromide of potassium, repeating the dose each two, three, or four hours, as found necessary. If irritability of stomach exists, the bromide of camphor may take the place of the potassium.

As formulæ for the first, the following may be given:

℞.—Tinct. verat. viride (Norwood's), gtt. viii;
Potass. bromidi, ʒi;
Aquæ, ℥i. M.
A teaspoonful pro re nata.

In using the veratrum viride it may be best to employ it unmixed with other medicines,—that is, where a nurse is to be trusted. Given in drop doses, it can be repeated each half-hour, or hour, until the frequency of pulse is found to yield. It is, however, a formidable agent, and is not to be used except under close supervision by the physician.

Lancing the tumid and congested gums is a practice that, in the majority of cases, will anticipate all necessity for constitutional medication. A lancet and an aperient, or a little iced lemonade, constitute the therapy commonly demanded in practice.

Concerning irritability engendered in the spinal cord by improper motions, much is to be said.

At the present time the writer has under his professional care a patient, where spasms of the neck-muscles of a most unyielding character are traceable directly to concussion produced from riding over the paved streets; although the carriage used by the lady is of the most luxurious description.

The jumping up and down of a baby in the arms of a nurse is, at the dentitional period, a reprehensible practice; quiet is the indication.

Not always is it, however, that dentitional irritability is found to have associated with it vascular perversion. It is grave to commit fault in such direction of diagnosis. To make such mistake could have no excuse; to learn the conditions implies alone the placing of a finger upon the temporal artery, together with appreciation of collateral circumstances.—A. B. C.

Reply to T. L., who asks in the May number of the Dental Cosmos for general principles or rules of practice to be relied upon in the treatment of Riggs's disease.

I suppose that allusion is made to the affection known among practitioners as "Peridental Irritation," that which every dentist observes so frequently in the mouths of his patients.

I would say to T. L. that it is a disease very easily combated when it is limited to the gum-tissue, but incurable when it has attacked the alveolar processes, because then the effect becomes in turn a cause.

That I may be better understood, I would say that when the cause of irritation has existed until the borders of the alveoli are exposed to contact with foreign bodies or fluids (saliva, humors of the mouth, etc.), there is then produced a suppurative necrosis of the processes which will not cease except with the loss of the tooth or teeth about which this disease exists.

This latter condition is not always easy to diagnose; nevertheless, if on pressing the gum pus exudes from between the gum and the side of the tooth, there is, at least, presumptive evidence of its presence; but if, after rational treatment for some days, the purulent flow has not been suppressed, there is no longer much doubt in the case, and it is almost certain that the trouble will not be cured except by the extraction of the tooth and the cicatrization of the gum over the alveolus.

It is necessary to know how to act promptly when one or a few teeth are threatened; and, when all are in danger, to retard to the utmost the progress of the malady by appropriate hygienic treatment.

When the affection is limited to the gums, and indeed when it affects only the exterior portion of the periosteum, remove the causes, which are 95 times in 100 direct,—tartar, clasps, pieces of artificial work, etc.,—and above all the abuse of hard brushes, which are 50 times in 100 the only causes of irritation, and substitute badger-hair brushes, and use several times daily such tonics as tinct. myrrh, cochlearia, red bark, etc.

By doing this for eight or ten days, following it with attention and without intermission, I have no doubt but that the result will be agreeably surprising.

It is evident that where the malady results from systemic influences, or is the effect of medicine, mercurials, etc., it will be necessary to combat these for the accomplishment of a cure.—G. G. ROUSSEL, D.D.S., *New Orleans.*

REPLY TO W. H. T., who in the July number of the DENTAL COSMOS makes some inquiries respecting the electro-chemical theory of the new departure.

To question 1. The action of electricity upon the animal economy is characterized by one of two results; it either builds up or breaks down.

The gold-filling becomes an agent of circulation and promotes chemical action, excites or increases this by establishing a galvanic current which acidifies saliva, and then aids in producing an agent like acid, which irritates the vital organization of the tooth, causes it to break down at the margins of the filling, and then we have electro-chemical decomposition. Enamel and dentine hold the same electrical relations to gold.

To questions 2, 3, and 5. This electrical action is established in all mouths, but is more active where an acid condition exists.

Few gold fillings are microscopically water-tight; there is moisture enough from the tubuli alone to establish this chemical condition, where the cavity is not bathed with some escharotic (carbolic acid or creasote) having an affinity for the tooth element forming insoluble compounds, so as to seal up the tubuli and render it nearer a negative condition to the filling.

Even Fletcher, in trying to refute the theory in criticising a paper of Dr. S. B. Palmer, says "That there is a distinct action visible in a delicate astatic galvanometer between the *plug of any material and the tooth.* Also there is an appreciable current to be obtained from almost *any two substances, living or dead.*" And this is confirmed by Dr. Palmer, and establishes the fact that, under all circumstances and conditions, there is a certain amount of chemical or galvanic action going on between the plug and the tooth.

But where the tooth is well calcified it *may never make any perceptible impres-*

sion, but when chalky and largely vascular it is likely to show the results of electro-chemical decomposition in time.

It has been clearly demonstrated that there is an incompatibility existing between the gold and tooth-bone.

Electro-chemical decomposition and ordinary caries are virtually one; the effects are produced through different channels, but the results are the same.

To question 4. We may expect tin to last an indefinite length of time if not worn away by attrition. The tin (proximate surface) exposed will turn black, the oxide will form a hard crust-like condition on the exposed surface, and this arrests chemical and galvanic action, and an antiseptic condition is established, putting the cavity walls in the most favorable state to battle with the elements.—F. E. HOWARD, M.D.S.

REPLY TO S. T. R., who asks concerning scurvy and congestion of the gums.

A great number of cases of scurvy, so called by patients, come under the observation of most dentists. Every unhealthy condition of gum-tissue, in whatever form appearing, by whatever circumstance induced, through whatever diathesis excited, is classed under the one common head. This being the case, diagnosis is seen to be with the doctor; not with the patient.

Answer to the query of S. T. R. is best made through an epitomized review of the subject of his inquiry.

Scurvy. Scorbutis. Although this disease is commonly discussed under a variety of heads, it is sufficient for the present purpose to consider alone the cardinal distinctives. Of these cardinal distinctives there are two, namely: 1. Scurvy of the sea. 2. Scurvy of the land. What is called sea-scurvy is, in reality, a formidable affliction. Scurvy of the land is commonly of little importance. The first attacks whole crews of ships which, by reason of long absence from land, have been denied necessary sanitary influences. The second is met with on land, being much more common to the country than to the town.

Sea-scurvy possesses the following diagnostic signs: prodroma of unusual uneasiness, together with sense of heaviness and difficulty of breathing, particularly after motion. Succeeding the prodroma come offensiveness of breath; frequent bleeding at the nose; cracking of the joints; difficulty in walking; swelling and sometimes falling away in size of the legs; livid-yellow or violet-colored splotches about the body; face commonly of a pale or a lead-color; gums first congest, then stagnation occurs in the capillaries, then mortification. Finally there is developed a wasting hectic fever. If at this stage relief be not quickly afforded the patient succumbs, being carried off either by diarrhœa, dysentery, dropsy, palsy, fainting fits, or by mortification of some portion of the bowels.

Scurvy of the land is ascribable to locations where the air is continually cold and moist; to the uninterrupted use of salt or of smoked meats; to the use of articles of diet hard of digestion and containing little nourishment; to suppression of evacuations; to grief, fear, passion; to improper dress; to sedentary occupations; to the continued breathing of impure air; and to debilitating diseases.

The above are the conditions which associate with and superinduce scurvy. To appreciate the clinical requirements of any particular case demands a consideration from the standpoint of the case itself. First, cause; second, associate conditions; third, treatment.

An English physician of extended experience and observation in the direction makes a summary of the matter as follows: We know of no way of curing scurvy but by pursuing a plan directly the opposite of that which brings it on. It proceeds from a vitiated state of the humors occasioned by errors in diet, air, or exercise, and this cannot be removed but by proper attention to these important considerations. If a patient has been obliged to breathe cold or damp air, he should be removed as soon as possible to a dry, open, and moderately warm location. If there is reason to believe that the disease proceeds from a sedentary life, or from depressing passions, the patient must be ordered to take daily as much exercise in the open air as can be borne, and his mind is to be diverted by cheerful company and other amusements.

Nothing has a greater tendency either to prevent or to remove this disease than constant cheerfulness and good humor. But this, unfortunately, is seldom the lot of persons afflicted with scurvy; they are generally surly, peevish, and morose.

When scurvy has been brought on by long use of salted provisions, the proper medicine is a diet consisting chiefly of fresh vegetables and fruits; oranges, apples, lemons, limes, tamarinds, and fruits particularly relished.

The use of such fruits, together with milk, pot-herbs, new bread, and fresh beer or cider, will seldom fail to remove scurvy of this kind if taken before it is too far advanced; but to have this effect they must be persisted in for a considerable length of time. When fresh vegetables are not to be obtained, pickled or preserved ones may be used, and when these are wanting, recourse must be had to chemical acids. All the food and drink of the patient should be sharpened with cream of tartar, vinegar, sulphuric or muriatic acid.

"I have often seen," remarks the same gentleman, "very extraordinary effects in the land-scurvy from a milk diet. This preparation of nature is a mixture of animal and vegetable properties which, of all others, seems most fit for restoring a decayed constitution, and removing that particular acrimony of the humors which seem to constitute the very essence of the scurvy and many other diseases."

Whey or buttermilk may be allowed with all freeness. When these cannot be had, sound cider, beer, and such like drinks may be used. A decoction of the tops of the spruce-fir is very proper. It may be drunk in the quantity of a pint twice a day.

Tar-water may be used for the same purpose, or decoctions of any of the mild mucilaginous vegetables, as sarsaparilla, marsh-mallow roots, etc. Infusions of the bitter plants, as ground ivy, marsh trefoil, etc., will be found beneficial.

Harrowgate and chalybeate waters are highly recommended. A slight degree of scurvy may be carried off by frequently sucking a little of the juice of a bitter orange or lemon. When the disease affects the gums only, this practice, if continued for some time, will generally carry it off. We would, however, recommend the bitter orange as greatly preferable to lemon. It seems to be as good a medicine, and is not near so hurtful to the stomach.

All kinds of salad are good in scurvy, and ought to be eaten very plentifully, as spinach, lettuce, parsley, celery, endive, radish, etc. It is amazing to see how soon fresh vegetables in the spring cure the brute animals of any scab or foulness which may be upon their skins. It is reasonable to suppose that their effects would be as great upon the human species, were they used in proper quantity for a sufficient length of time.

Effecting, then, the desired change in the system as recommended, or through any antiscorbutic treatment which may seem demanded by the peculiarities of cases, the local treatment which may follow will be found demanding only the ordinary attention.

We just now recall a case, which some two years since was under our care, which may serve as an example in practice. The patient, as we learned by inquiry, had been living for a considerable time previous to placing herself under care on salted provisions. So far had the disease advanced that several of her molar teeth seemed about to fall from their sockets; these teeth we removed, and sent her away, directing an entire change, which was not to be made too suddenly, in the manner of her living. Four months after we had the satisfaction of hearing from her husband that she had entirely recovered her general health, that her teeth had become firm, and that all discomfort in the direction of her gums had passed away. In this case no medicine was given, if we except a wash for the mouth, which, as we remember, was rather of an acid basis; she was, however, informed that with lemons, lemonade, bitter oranges, etc., she might be as free as permitted by her circumstances.

Again, we have diseases coming under our care denominated scurvy, which inquiry will discover to be pytalism. Here, also, as in scurvy proper, a constitutional must precede, or at least associate with, a local treatment.

Ptyalism is to be distinguished by a peculiar odor of the breath, by turgidity of the gums, by loosening of the teeth, by the great increase in salivary secretions, etc.

The treatment in ptyalism is nearly akin to that just described. The bowels are to be kept regular, saline purgatives, if necessary, being employed. Out-of-doors exercise to be taken as much as possible. The patient is to be warned against all intemperance.

Local treatment is to be adapted to the presentments of the particular case under consideration.

Example. Miss A., a lady, aged 20, presented herself, suffering from soreness about the necks of the inferior incisors, the effect of a slight mercurial treatment. In the case no further prescribing was found necessary than the suggestion of an astringent wash.

When, however, the exhibition of a mercurial has been such as to induce the local conditions of sponginess of the gums, offensiveness of breath, great increase of the salivary secretions, recession of the gums, etc., a valuable medicament is found in the ordinary marigold; this being freely used in the shape of a tincture as a wash to the parts:

℞.—Tinct. Calendulæ, ℥iij;
Aquæ, ℥ij. M.

Conjoined with the employment of this medicine, the lancet is to be used daily between the teeth; the cut in each instance being made to the bone.

When odor is a matter demanding special attention, and this is very commonly the case, chlorine water is found of great service, or, what answers even a better purpose, the phenol-sodique, in dilution. Tincture of iodine painted over the gums plays the part of a valuable alterative. When iodine fails of effect, it may be replaced with iodide of silver, in solution; two grains to the ounce of water.

Chlorate of potash, used both locally and systemically, is a favorite medicine with the profession. For local application, the salt is to be employed in the strength of a full saturation. For internal administration it is to be prescribed in doses of from 20 to 40 grains; dose to be repeated three times a day.

Teeth loosened beyond the possibility of retention are to be removed at once.

Turgidity, threatening necrosis, demands leeches beneath the jaw, while at the same time stimulants are to be freely employed inside the mouth.

Congestion of the gums arising out of a collection of concealed tartar, or out of the use of insoluble dentifrice, or out of the over-free use of alkaline detergents, possess their indications in the causes.—A. B. C.

CROWDED DENTURES.—Answer to "Dentos," in July number DENTAL COSMOS.

Whether it is desirable to remove certain teeth or not, can be decided only after examining the mouth.

That teeth are injured by pressure—at least the bicuspids, and especially those of the upper maxilla—I have no doubt. Incidentally, it favors the retention of food and increases the difficulty of keeping them clean. Directly, I think this pressure acts by so disturbing the structure of the teeth as to *locally* interfere with their development and nutrition.

I recently placed several bicuspids extracted from a crowded mouth in a red solution of aniline. They were very slightly discolored on the approximal surface, where they had been in contact, but a small excavator failed to find any defect. In about a week, half the approximal surface was deeply dyed, the color extending some distance around the spot first noticed, no other part of the enamel being affected. The teeth had been kept in water and alcohol from the time they were extracted (a few months) until placed in the colored solution.

In the mouths of young patients we meet such cases, presenting no visible defect, and perhaps in a few months find large cavities; or, perhaps, we find a slight defect, cut out all apparently defective structure, insert a filling, and in a short time have extensive decay around it (if gold, electro-chemical action—sure!); or we may file out the defect (Dr. Arthur's plan), and leave a wide self-cleansing space, only to have the same inevitable result.

In this condition the tooth *crumbles* under the instrument, it does not cut like normal structure; and when gold is inserted the manipulation *crushes* the surface of the cavity, especially at the margins. For this reason a plastic material will often do better.

In bicuspids, if seen in time, I prefer to wedge apart, avoid the file, make the cavity as small as possible, and use gutta-percha. I regard any operation as temporary until the entire approximal surface is replaced by filling. By close attention the use of plastic material may "stave off" the inevitable a few years, until both patient and tooth are stronger.

This is not often noticed in any but the bicuspids; sometimes the canines. They are the only teeth that have to wedge themselves in. Any treatment to prevent it must be prompt; probably the mischief is done before the tooth is in position.—W. H. T.

A CASE OF DILACERATION.—Miss S., now about 24 years of age, presented about five years ago for the purpose of having some teeth extracted, with a view to the insertion of an upper denture. I noticed at that time and called her attention to a lump the size of a large pea above where the right central incisor should have been. She said it had been there since she was eleven years of age. I believed it was the missing central, and advised its extraction. She feared the operation, and it was allowed to remain. The plate was made to fit over it, and she wore it with comfort for two years, when it was replaced by a permanent plate, which she is still wearing. During all these years there was no change in the lump apparent. About two weeks since she presented with a swollen lip and complaining of some pain. The lump had revealed itself as a tooth,—the right central, as I had supposed. The tooth was lying longitudinally along the alveolar ridge, with about three-fourths of its crown exposed. I extracted it without difficulty, and inclose it herewith,—a full-sized crown with a stunted and distorted root.—LUTHER CAMPBELL.

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DENTAL COSMOS.

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ORIGINAL COMMUNICATIONS.

THE MECHANICAL GENESIS OF TOOTH-FORMS.

BY C. N. PEIRCE, D.D.S.,

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(Read before the American Dental Association, Niagara Falls, August, 1878.)

We have received from Mr. John A. Ryder his paper upon the above subject, just published in the *Proceedings of the Academy of Natural Sciences of Philadelphia*. There is so much in it of interest that is pertinent to the subject of dental histology that we trust a *résumé* of the paper will prove acceptable to the association as a part of the report upon Histology.

Some of the conclusions Mr. Ryder arrives at from his study of the osteology of the Mammalia are as follows:

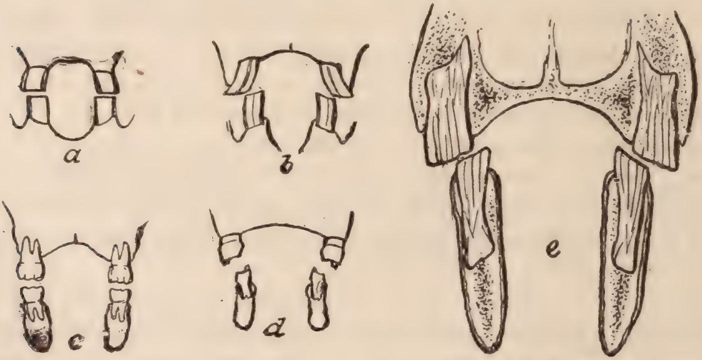
1st. That in *Carnivora* and *Omnivora* the jaws were simply opened and closed during mastication without lateral movement of the mandible or lower jaw, and that the earliest and most constant type of tooth accompanied this movement,—that is, that the tubercles or cusps composing the teeth do not to any extent depart from the short-rooted type with conical tubercles, styled by odontologists bunodont. That the distance apart of the series of molars of opposite sides, of both upper and lower series, was approximately alike,—that is, that in closing the jaws the external or buccal cusps of the upper series were brought exactly upon a line with those of the lower, not over them, as is the case in all *Herbivora* and to some extent in man. This condition he has styled isognathism.

2d. That in the *Herbivora* the jaws were opened and closed in mastication with extensive lateral movement of the mandible; and that the teeth were by this greatly modified in respect of their tubercular constitution, the tubercles being of the type known as crescentic, giving us the long-rooted selenodont type of tooth. That in these the width of the jaw, or the distance apart of the upper series of molars of opposite sides of the head, greatly exceeds the same measurement in the mandible, which results in the external or buccal cusps of the upper series closing over and external to the buccal cusps of the lower series. This condition he has styled anisognathism.

3d. That in some *Rodentia* and *Proboscidea*, the mandibles were moved in a backward and forward, or antero-posterior direction, which he has termed the reciprocating movement, with which there was also a corresponding tubercular modification, which he calls trichecodont,—three tubercles forming transverse ridges, frequently obsolete, or greatly flattened transverse lamellæ, composed of elongated and united tubercles soldered together by a thick cementum layer (*Elephas*). Isognathism is usually a characteristic of this subdivision.

4th. That in a subdivision including a part of *Rodentia* and *Proboscidea* (Mastodons), the movement of the mandible was both reciprocating and lateral, with a still more complex type of dentition as a result, which he has styled ptychodont,—enamel fluted and folded upon itself longitudinally and transversely. These jaws are usually anisognathous.

FIG. 1.



a and *c* represent, in transverse diameter, isognathism; *b*, *d*, and *e* represent anisognathism.

The foregoing groups Mr. Ryder has tabulated in the following manner:

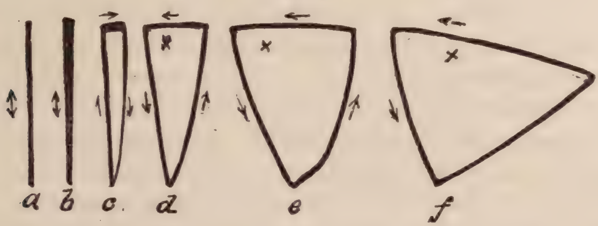
1. No lateral movement (Omnivora) Isognathous.
2. Lateral movement (Herbivora) Anisognathous.

3. Reciprocating movement	Some Rodentia Some Proboscidea	Isognathous.
4. Lateral and reciprocating movement	Some Rodentia Some Proboscidea	Anisognathous.

These observations, based upon investigations made not only upon the skulls, but also upon the living animals, afford, he thinks, the key whereby to correctly interpret the morphological history of the teeth of the higher groups, especially when brought to bear on the interpretation of the teeth of the great number of herbivorous remains which the rocks have yielded in recent times, as intermediate or antecedent forms.

The accompanying illustration is given as diagrammatically representing the figure described by the mandible, when in motion, of different varieties of animals. *a* is the figure described by the tip of the mandible of the *Carnivora* and *Omnivora*, represented by the dog and hog; *b*, a transition form, observed in the wart-hog; *c* is that described by the end of the mandible of the tapir and the kangaroo; *d* is a theoretical form, suggested for the extinct and intermediate horse; *e* is the figure peculiar to the rhinoceros; and *f*, that made by the giraffe and other ruminating animals.

FIG. 2.



The figure *a* belongs to and is characteristic of Group 1, as defined above. The remaining figures, *b*, *c*, *d*, *e*, *f*, serve to characterize Group 2. Groups 3 and 4 have not been illustrated, but can be easily and clearly conceived by reference to the definitions of the groups given.

The number of kinds of excursions made by the mandibular rami is limited by structural impediments, since a bar fixed at one end and free at the other, to which the mandible may be compared, is capable of but a few distinct movements. We find these to be essentially those mentioned in the definition of the four groups; few others are possible or conceivable. The first movement is the vibratory one in a vertical plane; the second is the vibratory movement in both the horizontal and vertical planes; the third is the vibration of the rami in an approximately horizontal plane, neither lateral nor vertical, but an antero-posterior or reciprocating movement, parallel to the medial axis or line; the fourth is that which combines to a great extent the second and third. It is also to be observed that the lines described in most cases are not straight, but only approximately so, they being more or less curvilinear. With these four distinct types of mandibular movement there are as many distinct types of tooth-modification, to which almost all the forms of teeth of Mammalia yet known may be referred. The bunodont type is that characteristic of Group 1, and in which the tubercles have not been modified, because there have been no movements of a proper kind to produce the modifications in the enamel foldings, as observed in the longitudinally- or the transversely-folded enamel crowns of the lophodonts (ridge or hill tooth). To this foregoing Group 1 belong also all the haplodont types (simplest forms), as observed in the toothed whales.

According to the doctrine of mechanical dental differentiation, the foldings of the enamel in the teeth of Groups 2, 3, and 4, whether they be longitudinal or transverse, are due either to the lateral or reciprocating movement of the jaws. The sub-group,—selenodonts,—so called in consequence of the crescent-shaped foldings of the enamel of which the deer is a familiar example, is perhaps the most striking illustration of all. The characteristic crescent-shaped tubercles, the author thinks, have probably been evolved by a very slow process of flattening and bending outwards or inwards of the cornu of the tubercles, due to the strains exerted in masticating the tough woody food. The movement in this case, being constantly in one direction, makes it still more probable that such has been the history of the process.

In a subsequent communication from the author, he says, "I have never yet been able to satisfy myself in regard to the direction of the motion of the ramus when the jaws are in contact, though it has occurred to me that it would make but little difference, since the obliquity of the crowns of both the upper and lower series in opposite directions would render it a matter of little consequence whether the movement were from within outwards or from without inwards, because in both cases the mechanical conditions necessary to effect the requisite differentiation would exist."

He says further, "It is, moreover, noteworthy that in no instance have I been able to discover that the plan of the enamel foldings of the teeth in any lophodont was such as not to agree with the direction and kind of mandibular movement."

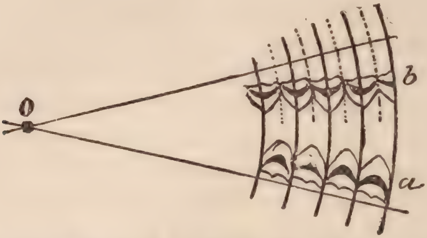
From the views advanced and the illustrations confirming them, which we have extracted from the paper in question, as well as some few which we shall yet present, the author feels that he has good and valid reasons for regarding "the condylar articulation of the mandible as the odontomorphic or tooth-shaping center,—that is, that they, the condyles, are the fulcra from whence all the dental impacts incident to mastication are controlled, giving us certain specific kinds of persistent movements which could effect modifications. The persistence of the type of movement renders its effect cumulative, whilst the addition of the factor of heredity renders it permanent."

In speaking of odontomorphic centers, the author says, "While making measurements of the skulls in the collection of the Academy some curious facts were elicited. It was observed, that, if a pair of dividers were taken, placing one point on the glenoid cavity of the skull or condyle of the mandible, the curvature of the cross-crests and intervening valleys of the molars of the same side would exactly coincide with that produced by a sweep of the free point of the dividers across them. The same rule was found to hold good in regard to the other side of the skull. We were not long, however, in finding that this rule was not universal among selenodonts; that there were some in which such a coincidence could not be obtained by the method described. It was then observed in these other cases that, if one leg of the dividers was placed on the posterior end of the basi-sphenoid bone, opposite to and midway between the glenoid cavities, for the superior molar series, and midway between the condyles for the mandibular molars, the arc described by the point of the free leg would now coincide in the curvature with the cross-crests and bottoms of the valleys of the molars of both sides when extended across their crowns."

For convenience, he designates the teeth the cross-crests of which coincide in curvature with arcs described respectively from the right and left glenoid cavities as centers for the molars of these sides respectively, as *biaxial;* and those where the center of this coincident arc is medial on the basi-sphenoid bone, or midway betwixt the condyle, as *uniaxial.* These centers may be named odontomorphic or tooth-shaping, since they are the fulcra which control the forces which slowly modify the shapes of the teeth and their component tubercles. The biaxial molar is by far the most numerous, he having observed it in the following orders: *Edentata*, Proboscideans, most Rodents, Perissodactyles, Marsupials, and, indeed, most of the *Herbivora*, while the uniaxial was confined to the *Tragulidæ*, a species of deer, and a few Rodents.

The author says, "There seems to have been a metamorphosis of molars and premolars, which proceeded with greatest rapidity nearest the mandibular articulation, where the modifying forces were also applied with the greatest mechanical effect. The mandibular masticatory apparatus of mammals may be regarded as levers, in which the glenoid cavity is the fulcrum, the muscular force exerted by the masticatory muscles the power, and the resistance of the food to the teeth in crushing it the weight. Since the coefficient of muscular force is one hundred and four pounds per square inch of transverse section, it is easy to surmise what would be the tendency of the exertion of the force of many square inches in section of masticatory muscle upon the jaws and teeth in mastication. It would manifestly not be consumed in the mere comminution of the food, but it must also react upon the structures which were directly subjected to the resulting strains, viz., the teeth. In a mammal as large as the rhinoceros, the area occupied by the mandibular teeth is about five square inches, while the maxillary teeth occupy about ten square inches, as I have roughly estimated from a skull nearly adult; the ratio then of the triturating surfaces of the upper and lower series is about as one is to two. These ratios increase apparently as anisognathism increases, and conversely become equal as isognathism prevails,—that is, we may select a perissodactyl, such as the rhinoceros, or an artiodactyl, such as the domestic ox, to represent one extreme, and the universal pig as the other."

FIG. 3.



Ideal diagram, showing the mode in which the lower molar series, *a*, sweeps over the upper series, *b*; the movement being constantly regulated from the mandibular articulation, or odontomorphic center, *O*.

The articulation of the mandible with the skull presents three well-marked types, viz., that observed in bunodont, with a more or less distinctly cylindroidal mandibular condyle, the selenodont, with transversely-expanded and superiorly plane condyle, and the lophodonts, with a more or less nearly globular condyle, which in forms with much reciprocating movement becomes elongated antero-posteriorly, narrowed transversely, and fits, in some instances, into a well-marked, longitudinally-disposed glenoid cavity. In those forms in which there is much lateral motion the rami of the mandible are also much more closely approximated than the molar series of opposite sides above; while in those forms without the excursive lateral movement there is little or no such difference in the interval between the molars of the upper and lower series respectively.

It is therefore apparent that the relations supposed to exist between mandibular movement and tooth-forms must be extended so as to embrace not only changes in the form of the teeth, but also changes in the relations of the mandible and the form of their condyles and the glenoid cavities. The whole of these changes have been apparently dependent upon the mode of use of the parts and the force exerted.

It is further to be observed that those animals which have the most powerful masticating apparatus invariably have the most deeply-implanted teeth and the most effective arrangement for the replacement of tooth-structure when lost by wear.

The incisors of many animals having been lost or hypertrophied, either from the assumption of their functions by other parts, as the lips, tongue, or trunk, or by substitutions of another function, as in the case of the tusks of the Proboscideans, it would seem that mechanical resistance has much to do with their special development, as also seen in Rodents.

A summary of the foregoing views the author has stated as follows:

"1. That the earliest and simplest type of mammalian jaw-movement was that in which the mouth was simply opened and closed, without mandibular excursion, and co-existent with the simple haplodont or bunodont molar.

"2. That the development of the various kinds of excursive mandibular movement has apparently been progressive.

"3. That as the excursive movements have increased in complexity there has been an apparent increase in the complexity of the enamel foldings, ridges, and crests.

"4. From the fact that the foldings, etc., have apparently been modified in conformity to the ways in which the force used in mastication was exerted, it is concluded that the various modes of crest and tubercular modification are related as effects to the diverse modes of mandibular movement.

"5. It is apparent from the facts presented throughout the context that the mandibular articulations, and correlatively the whole skull, have probably been modified in shape by the movements made by the jaws and the forces exerted in executing them.

"6. From the fact that incisor teeth are partially or entirely absent or relegated to another function in forms which have long prehensile tongues, mobile, prehensile lips or proboscides, it is held to be probable that such disappearance of the incisive dental elements is due to the assumption of their function by the prehensile organs indicated."

These views may also have some practical bearing upon dental science, and show that the edentulous theory advanced by our friend Dr. Thompson, based upon the degeneration of the human teeth, may have some foundation in science. The almost universal prevalence of dental caries and other dental deformities is doubtless in a large measure due to a want of a proper use of the teeth in comminuting harder food, which would be a constantly active stimulant, tending to produce a healthier and stronger development.

The long-established and increasing use of soft foods, in the light of the foregoing facts, has an unmistakable tendency to cause the teeth to become diseased, and, if there be truth in the doctrine of hereditary transmission, will in time render the human family more or less edentulous.

ADDENDA TO ETIOLOGICAL VIEWS EXPRESSED IN A PAPER "ON THE MECHANICAL GENESIS OF TOOTH-FORMS."*

BY JOHN A. RYDER.

I HAVE attempted in a previous paper to show that the necessary movements of the jaws of mammals have been instrumental in producing changes in the structure and form of their teeth, although the generalization is perhaps a bold one, and calculated to startle those accustomed to regard each and every organic form as the result of a direct and special act of creation.

That the word species as applied in zoology is incapable of definition is proved by the fact that from the days of Linnæus to Agassiz scarcely any two authorities have been able to agree as to what was included and defined by it. Therefore, until the scientific world is agreed as to what constitutes a species in the abstract, it must not be surprised to find persons who will deny their existence either partially or totally. The labors of Darwin, Haeckel, Huxley, Cope, Marsh, and many others have shown that if the mutability of species has not been proved, there is a strong ground for believing that such is the case, for it must be admitted that the facts show them to be exceedingly variable. This is the experience of the writer in his studies among mammals, reptiles, and amphibians; and it has uniformly been the experience and one of the difficulties encountered by the botanist. While we would be among the last to ignore the existence of specific forms, we cannot but deprecate the tendency now existing to multiply them needlessly, and we fear often almost knowingly.

There are some scientific minds that can be content with tracing these variations for the sake of the differences of form alone, and for the establishment of new species and genera, with the purpose of gratifying an ignoble ambition by appending their name or its abbreviation to the end of the species they have so discovered and named. There is another class of students who care nothing for the individual and specific differences except as a means to elaborate the laws and principles which govern organic phenomena. It is gratifying to be able to say that there are a great many workers beginning to take up such lines of inquiry; but they have heretofore confined themselves more especially to morphological studies dissevered from any intimate connection with the operation of the forces of the surrounding world. Many of these workers state their belief in the potency, or rather adequacy, of externally and internally generated forces or resistances to produce changes of form, and in the long run concomitant changes of structure also.

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* Proc. Acad. Nat. Sci., Phila., 1878, pp. 45–80.

It has been for a long time evident that in order to prove that such was the case it would be necessary to find instances in which artificially instituted conditions had produced changes of form or organization which could not be attributed to any other cause. There are but few cases on record from which so much can be predicated in cases pertaining to the lower animals. John Hunter's experiments upon the influence of a gramineous diet in effecting a thickening of the muscular walls of the stomachs of carnivorous birds are as conclusive evidence as could possibly be adduced; and, as is well known, the wonderful reparative power of organisms is simply a special expression of this power, such as in the curious alterations in the bony structure of the foot when injured, so as to adapt to its old conditions. It is greatly to be doubted if the so-called action of medicines and reparative processes in disease are not also special instances of the manifestation of this power of adaptation so peculiar to living bodies. In a word, it is an effort at a re-adjustment or equilibration of the life-forces, this effort being familiarly called disease.

In many cases the effects of altered conditions can be traced through the steps of the changes they produce. This is notably the case in the alteration of the form of bones which have been injured or which have been vicariously compelled to assume the function of some other, as in the case of the extirpation of the shaft of the tibia the fibula enlarges and assumes in a greater or less degree the office of the larger bone. In this case, as in the case of the change in the stomach due to the greater hardness of the food of the bird, the effects are obviously related to differences in the degrees of resistance to be overcome. The development of sclerous or osseous tissues in situations subject to severe impacts from without is clearly due to a like set of conditions as instanced in the foregoing. I know of no better instances illustrative of this than the mouth parts of many insecta, and especially of the *Termitidæ* and *Scolopendra*. In these the chitinous half-rings of the somites are relatively soft, and white or pale, while the mandibles and maxillæ are brown or black at the tips, and very dense and hard. In the individuals known as soldiers among the *Termites*, the mandibles are more developed than in any other individuals of the colony, and the dense, black extremities of these organs are of course more marked than in any others.

There is, then, an apparent relation between use and the strength of the part used, which needs no other explanation than such as will recognize the force exerted by the muscles of the creature as a retroactive stimulus evoking development of strength, not only of muscles, but of sclerous tissues, wherever needed, and, conversely, causing degeneration or retardation of development in parts not exercised. Without going into the argument as to whether horns and hoofs have had a similar origin, it is evident from the foregoing facts that we have here the promise of an inductive basis for the study of animal morphology grounded upon the more or less exact and yet to be created science of animal mechanics. We have said nothing of innervation or sensation, because it is patent to every one that sensation must precede voluntary motion in order of time; moreover, the discussion of sensation involves indirectly its origin and the origin of life and consciousness,—questions which give little promise of being settled by either Tyndall or Bastian.

Granted that there is an inductive basis upon which the science of the mechanical differentiation of organisms may be founded, it follows that the science is almost wholly of an empirical character, or, in other words, based upon a wide range of minute observation and experience. Those who have made themselves familiar with the writings of Darwin, Parker, Huxley, Haeckel, and Spencer can realize the importance of this principle, and the brilliant results possible of attainment by carefully and thoughtfully guided researches in almost any department of biology.

Whilst engaged in a review of the osteology of the mammalia, I came across such facts as I thought might receive a rational explanation from a series of observations made upon the living animals. In this I was not disappointed, nor have any facts since been brought to light which in any way weaken the conviction that the inquiry rests upon sound principles.

"PLASTIC FILLING" AS A "POWER" IN DENTISTRY.

BY J. FOSTER FLAGG, D.D.S.

(Read before the American Dental Association, Niagara Falls, August, 1878.)

MR. PRESIDENT AND GENTLEMEN:

As the result of more than thirty years' experience in the practice of dentistry, I find myself in the front ranks as an ardent, earnest, conscientious advocate for the use of "plastic" materials for filling teeth.

As the chosen enunciator of the "basal principles of the New

Departure," I spoke on behalf of my friends, Drs. Palmer and Chase, at the last November meeting of the New York Odontological Society.

I spoke then for "basal principles," which should so govern practice as that a great advance might be made in the *saving of teeth* over that, which you all know has resulted from the practice of the past.

I recognize as well as you do the high appreciation which the whole world extends to American dentistry.

I recognize as well as you do the wonderful manipulative skill of our "best operators."

I recognize as well as you do the vast amount of good which has been done to the community and the world by all this hearty effort, but I *also* recognize that *in despite of it* our people are *semi-edentulous*, and that the whole civilized world is flooded with *artificial dentures.* Dentures on celluloid, dentures on rubber, dentures on silver, and dentures on gold, dentures on porcelain, and dentures on platinum, dentures on everything *except the roots which God designed for their support.*

Is it too much for me to claim that this result is due largely to the teaching that *gold* is the *best* material with which to *save* teeth?

Gentlemen, my plans for life (if life is spared) are such as that it is most probable that many years will pass before I meet with you again, if ever, and I therefore desire the more to leave with you that which I have brought, most solidly, most clearly, and with the utmost kindness.

To those of you who differ with me most entirely, I ask that you will *permit* an honest difference of opinion; that you will accord to me sincerity of purpose, and that while you combat *my views* to the utmost, you will not expend any strength in *personal* antagonism.

I am nothing in this; I merely advocate principles and practices which must stand or fall solely upon their own merits.

If I can say to you that the practice which I advocate is *eminently* successful, and you have no *reasonable cause* for discrediting my assertion, it is your *duty* to your patients and your profession that you examine well its workings, and make yourself so conversant with its minutiæ as to be *fitted* to express opinions, rather than be content to pass it by in wholesale condemnation.

If I can say to you that with the gradual abandonment of gold I have *also* equally come to the abandonment of artificial dentures, it behooves you to look to it and *see* the connection which exists, if there be any, between the two.

Is gold the easiest material with which to fill? Is it not the most difficult?

Is gold the quickest material with which to fill? Is it not the greatest consumer of time?

Is gold the most comfortable material with which to fill? Is its use not usually attended with more discomfort than any other filling?

Is gold the most economical material with which to fill? Is it not, by far, the most expensive?

Is gold the most durable material with which to fill?

I ask you, gentlemen, is it *possible* that your experience is so adverse to mine as that you can say that in the teeth which *most need* saving gold is the most *durable* of all your fillings?

Then, if gold is the most *difficult*, the most *tedious*, the most *uncomfortable*, the most *expensive*, and *not the most durable* material with which to fill teeth, is it not a *reasonable* deduction that its almost exclusive use, and its constant adulation, its upholding as the *test* for dental ability, and its universal acceptation as the *best* of filling materials, has *much* to do with all this flood of pulpless teeth, of alveolar abscesses, discolored crowns and jagged roots, of toothless jaws and plates of india-rubber?

I put this *strong*, gentlemen, that you may see how it looks to, at least, *one* of you; that you may be led to think that *if* it *can* so look to any one, perhaps it may be worth your while to make examination of that which seems *at first* absurd.

I tell you my patients do not think that it is *absurd*.

I assure you those that have had decades of years of past experience are loud-mouthed in confirmation of what I say to you.

Hundreds of patients have been for years comparing notes with the results in mouths of friends, and their testimony corroborates my own experience.

Hundreds of patients who have tried for years "accepted dentistry," regardless of time, suffering, and expense, and who now for years have tried the dentistry which I advocate before you, have not words sufficiently expressive of their condemnation of the former, or of their satisfaction with the latter.

It is not I alone who can tell you this; my office has been no "closed *sanctum*." Its door has ever been open, and many, I am happy to say, have brightened my rooms with the light of their faces.

They have both *seen* and *heard* this that I claim for our "New Departure" practice. I have plenty of words and letters which assure me of the great modifications in practice which have grown out of these visits.

If all of you do not know me well enough to feel assured that I tell you of these things *because* I feel that I should be derelict in my duty to my profession and to *you* were I not to do it, I am happy in the conviction that some, *and indeed many* of you, do me the justice to believe this.

I desire that you shall know of these *possibilities*. I desire to have no *secrets.* I desire to have the privilege of saying to you that I practice from an entirely different stand-point from that which, up to this time, has been given by text-books and colleges.

I desire to tell you of the *comfort* which comes from this practice, both to patient and operator.

I desire to tell you of the *ease* with which apparently insurmountable dental difficulties are overcome.

I desire to tell you of the *satisfaction* with which each year's successes are added to those of all the previous years.

I desire to tell you of the feeling of proper pride—ay! *thankfulness* —with which I see the years roll on, while arches by the hundreds remain unbroken.

I desire to tell you how *economically* all this is done; how promptly and willingly bills are paid; and how frequently words of good cheer and commendation accompany "*checks*" for services rendered.

But, gentlemen, I desire, above all, to say to you that *I attribute all this mainly to the use of "plastic filling."*

I wish to say to you, AT THIS TIME, that with the practice which some of you *know* I have, and with the character of practice which you may, all of you, *infer* I have, and in a city which has just claim to rank high as proficient in dentistry, *I have not used one sheet of gold foil for almost two years, and have sailed for the past seven months with "no gold used" in capital letters upon my appointment cards.*

I wish to say this *openly*, for the comfort and support of those who desire to *use* plastic filling materials.

Gentlemen say that our promulgation of such practice will lead to wholesale, unworthy use of plastic fillings.

That is no affair either of ours or *theirs.* Let *them* learn to use them *worthily*, and thus *by example*, rather than precept, show our erring brothers the error of their ways.

But while I advocate thus strongly the use of *plastic filling materials*, and while I state to you that *I* have completely abandoned gold, I wish you distinctly to understand that this practice is not now, *and never has been*, advocated by the "New Departure."

In the presentation of our desires, *it was expressly stated just what kinds of teeth should be filled with gold, and just what kinds of teeth should be filled with plastic fillings.*

This having been misstated and misrepresented, the assertion is now made that what we desire is no "New Departure," but is just what has long been practiced as "eclectic dentistry."

Now this is just as far from truth as were the first misstatements.

That plastic filling materials have been used in a sort of clandestine manner, and as desperate "last resorts," we admit.

That they have been used *apologetically*, and with the assertion *and the belief* that they were a species of something *inferior*, only to be used in teeth which were not "*worthy to be filled with gold*," we admit.

That their employment was generally regarded as *derogatory* to "first-class" ideas, and that the fillings were stamped as "second-class," we contend.

And we insist that while even *excellent* practitioners admitted that they occasionally employed gutta-percha, oxychlorides of zinc, and even amalgam, there were still some who asserted that they "never used anything but gold," and who from this claimed a *superiority*, which by the members of the profession at large was tacitly accorded them.

In contradistinction to all this,—in marked deviation from all this,—we desire that a "New Departure" practice shall recognize that, for certain *definite* kinds of teeth, and for cavities in certain *definite* places, *for which at present* gold is regarded as, and stated to be, "the best," other materials than gold are *better* than gold; that they will preserve teeth better, and that *therefore* gold is *not entitled* to the broad credit of being the "best" material for filling teeth.

We wish it to be understood by the profession, *and secondarily by the community*, that, *even if* gold is the "best" material for the *hard*, *strong teeth* and the easy places, it has to take a *subordinate* position when the *soft* teeth and the *dreadfully difficult* and inaccessible places are marched to the front, *for* that *gold* is NOT THEN our *best weapon* for defense.

And more than this, we insist upon it that just in proportion as teeth are more and more in *need* of a *preserver*, so does gold *less* and *less* meet the requirements, and this *too* even in the hands of the *skilled few* who *cannot care for the one-thousandth part* of the teeth that *need* saving.

Our "basal principles," we think, must become "accepted." Gold must be *known* and *recognized* as NOT THE BEST in many, many cases.

The mere fact of "leakage" must be *known* to be not *necessarily* detrimental.

It must be *known* and *acknowledged*, that while "leakage" is *fatal* to the integrity of a gold filling, it is *not practically detrimental* to one of gutta-percha, while again it may, *in some instances, be the very thing which effectually arrests decay* under fillings of tin and of amalgam, thus causing them to preserve, for a long lifetime, the teeth which are so soon lost in ordinary practice with the use of gold.

Compatibility of filling material with tooth-bone must be *known* to be *the great foundation-stone* for the successful saving of the teeth, and such splendid materials as gutta-percha, amalgam, and the zinc plastics must *not* be TAUGHT to the *rising generation* of operators as "temporary," "vile," "worthless," and "ruinous to teeth," and their employment as "tending to *degrade dentistry!*"

And now, gentlemen, I wish to call to your notice what a "power" this plastic filling has become in dentistry.

It is *even now* a very well worked-up *specialty* of our profession; one that is *so little known* as *scarcely to be mentioned* except with contempt or disapprobation from the *lecture-stand*, AND YET, *one which can* NOW *take any denture so forlorn as to be* HOPELESSLY *abandoned by the* BEST GOLD OPERATOR *in the world*, and make of it a COMFORTABLE, SATISFACTORY, and BEAUTIFUL SUCCESS.

This is a marvelous claim, but those of you who *best know my record* will not for a moment think that I would say anything which I could not substantiate.

I have been doing this for years; it is now nearly ten years since I passed the "half-way" station at which I filled fifty *per cent.* of all my cavities with "plastic fillings;" as I have told you, it is now *almost two years since I have used any gold*, and during all this time the "hardest" kind of practice, in the shape of the "softest" kinds of teeth, has been aggregating apace.

I have, to the full, those "very soft teeth which" (as a member of the New York Odontological Society lately said) "we all dislike to see at the very first sitting," and there is *no such feeling* engendered by their presence. It is only a source of satisfaction, as I inform the patients of the ease and comfort which I can give them in place of the pain, discomfort, and dissatisfaction which they have before experienced.

It is only a source of increased incentive, as year after year demonstrates to them, as well as to me, the strength of my position; and the constant and frequent recurrence of such remarks as, "How different this is from what it used to be!" "How long it is since I have lost a tooth!" "How glad I am I learned of this!" and such outcroppings of gratitude and satisfaction, lighten my labors, make me thankful for the instrumentalities which enable me to bestow such blessings, and cause me to wonder if it *can be* that it will be *long yet* before hundreds will be *educated* to leap joyfully over the long road which I have so slowly traveled.

And such a practice as this I tell you of is spoken lightly of—yes, worse than lightly—by the last guard of "accepted dentistry,"—men who *know nothing* of our work, who *know nothing* of our operations, who *know nothing* of our tooth-saving, beauty-making, comfort-giving, permanent combinations of our plastic fillings; men who *know nothing* of the proportions, or even of the components of our materials, *who do not even know their names!* much less their qualities or modes of working; who would not know their proper uses or their proper using if they were given them; and yet these men condemn it all, and in no measured terms, and thus *teach dentistry!*

Until quite recently (!) scarcely any one has claimed to use amalgam *much*, and yet, for many years, the steady increase of demand has been supplied by Townsend's, Walker's, Ash's, Lawrence's, Smale's, Arrington's, Moffitt's, Ashmead's, Hood & Reynolds's, Holmes's, Diamond, Luther's, Sullivan's, Fletcher's, Welch's, Davis's, Dunlevy's, Chicago (gold and platina!), Weston's (S. S. White's), Standard (Eckfeldt & Du Bois's), "Best" (Spencer & Crocker's), Stannous Gold ("O. P." Chase's), Sterling (Davis & Leyden's), Extra (Johnson & Lund's), and Hardman's, of Muscatine, Iowa; and these alloys, so far from being "*all the same*," are composed, some of two metals, some of three metals, some of four metals, and some of five metals; each has certain individual characteristics; each has its rapidity or its slowness of "setting;" each has its grade of shrinkage, though some say "no shrinkage;" each has its grade of edge strength, its liability to discoloration, its extent of bulging, and its value as a filling material for saving teeth. All this should be recognized by the professors of operative dentistry, and *all the facts* in regard to *each* should be *taught* as a part of dental education; *for* amalgam will save, *for it has saved*, many a tooth that had been tried by the best operators *unsuccessfully* with gold.

For gutta-perchas we have, for *red*, selected "base plate," and, for *white*, we have Hill's, Bevan's, Jacob's, Codman's, Johnston's, White's, Gorges's, Johnson & Lund's, Caulk's, and many others of lesser note; each of these has its rank, its heat test, its appropriate place, its proper method of manipulation, and, as these are known, its *value*.

For oxychlorides we have Sorel's, as the first, and type of all, followed by Metcalf's, Pearson's, Houghton's, Roberts's, Kellnitz's, Smith's, Fletcher's, Poulson's, Worff's, Cement Plombe, Rock Cement, Gutensohn, Franzelius's, Crystalline, German Cement, Agate Cement, Acme Cement, Ludwig's, and Foundation.

Then we have the oxysulphates, which are mixed with mucilage or clear water, are non-irritating, and used for protecting pulps; and finally, the oxyphosphates, of which we have already some eight varieties, the most notable of which are Poulson's (six shades), Grass & Worff's "Zinc Pyrophosphate," and Jiletti's "Piro-osseina" and "Piros-maltina."

Is there not a host of them? and do you suppose that gentlemen who have but infrequently used any of them *know all about all of them?* I THINK NOT!

Every kind of "plastic filling material" has its own decided peculiarities of manipulation, during which it is found necessary to employ for explanation and comparison of views such terms as "weighing, rubbing, mixing, washing, heating, setting, tapping, trimming, bulging, talcking, cold-soldering, capping, guarding, softening, lining, pelleting, whitening, wafering, buffering, domeing, facing," and the like,—terms, each of which conveys to the mind of the plastic-filler the idea of some definite process, action of material, manipulative result or specific means for the accomplishment of some desired end.

So far from all this being "*guess work*," we have a range of "tests" which tell us very well what we may expect of any material under given conditions. These are such as strength test, edge test, setting test, shrinkage test, expansion test, color test, heat tests (wet and dry), leakage test, froting test (for probable wear), acid test, alkali test, conduction test (electrical and thermal), and, finally, the oral test, which decides the compatibility of materials with tooth-bone and their behavior *in the oral fluids* and *under oral influences.*

By means of these tests we are enabled to make a choice of material to meet the varied indications that constantly present in practice, which, to our apprehension, approaches to SOMETHING LIKE SCIENCE.

It is by these means that we frequently combine two, three, four, or more different materials in the filling of one cavity, each of which best subserves its purpose in its appropriate position, and insures an operation which for comfort, beauty, and permanency can *in no other way* be equaled.

It is a source of no little satisfaction to me that I can say that my office has been an open "clinic-room" for many years; students of a week, graduates of a year, and venerable practitioners of almost half a century's experience, have been alike welcome, and have seemed alike satisfied. They have each left their contribution to my store for dissemination, and they have each told me that they took away, in return, something which compensated them for their visit.

It has always been a pleasure to me to answer notes of inquiry, and, when in my power, to give the desired information.

My relations with the class, as incumbent of the chair of Dental Pathology, were of an exceedingly pleasant nature, warming frequently into close personal friendship. I have enjoyed an intimacy with men in our profession which has made me feel that it *must* of necessity include some of the choicest distillations of humanity; and it is, therefore, with no ordinary feelings that I have come to this meeting, bringing with me the conviction that it must be "for years, and it may be forever," that our *associate relations* will be severed. I feel that, *professionally*, my *associate life-work* has been done. I feel that it has been vouchsafed to me to open before you a professional pathway which is one of success, relief, and compensation to *you*, and of great comfort and satisfaction to *your patients*. I feel that in its pursuance you can, as I have done, practically ignore mechanical dentistry,—that boon, that almost priceless blessing, to those who require it; but how much better *not to require it!* With the same energy that has been expended upon "gold" directed in the channel of "plastic filling" *the children of our children should view an artificial denture as a curiosity.* My patients have no knowledge of them. Why should yours have?

But to accomplish this you have a big field to plow; it has to be harrowed, planted, and cultivated; by these means *only* can you secure a crop. But the harvest is worthy all the labor you can give. It makes of dentistry a *blessing* to the patients, and a *luxury* to its practitioners. I *know*, gentlemen, *because I have it so!* I have faith to believe that it will be given to you, and that you will find it so, and in that faith *I leave it with you.*

PERSONAL.

By courtesy of the editor of the Dental Cosmos, I am permitted to make the following statement in these pages:

Having formally retired from the American Dental Association, the only society of which I have remained an active member, I desire to state that circumstances compel me to request that I may also be relieved from all other associate duties but that of my usual contributions to our dental magazines.

In thus withdrawing from further professional correspondence, and in thus closing my office as a *clinic-room*, I desire that my brethren shall remember that both as correspondent and demonstrator I have had for many years my full share of duties, which I have always esteemed it a pleasure and privilege to perform.

As these years have passed this work has naturally increased, until it has now reached a point which makes of it a task too arduous for me, and too frequently an interference with my professional engagements.

These considerations, together with others of a non-professional nature, compel me to adopt a course which is so entirely different from that which I have always followed, and so at variance with my own inclinations, that I feel it due both to my fellow-practitioners and to myself to make this explanation.

With feelings of the kindest regard, J. Foster Flagg.

WHY DO FILLINGS FAIL? THE OLD THEORY vs. THE NEW.

BY W. H. TRUEMAN, D.D.S., PHILADELPHIA.

(Read before the Pennsylvania Association of Dental Surgeons, Philadelphia, June 11th, 1878.)

While it would be a useless waste of time to attempt to prove that fillings do not always remain in, or remaining in do not always effectively stop the destructive action which has made the filling necessary, it may be well to inquire, What constitutes a failure?

The teeth have a full share of those infirmities, the common lot of every organ of the human body, while lacking in a great measure their recuperative powers. A perfect, healthy tooth, in a perfect, healthy mouth, never needs any attention from this branch of our specialty. The fact that a tooth needs filling carries with it evidence that something is wrong. Our ability to right that wrong depends upon its origin, extent, and character. Our expectations must be measured by nature's ability, as well as our own.

The bare fact that a tooth has been filled and in a year's time extracted, is in itself no more evidence that the operation has been a failure than the death of a patient after a surgical operation is a reflection on the surgeon's skill. In either case the failure to derive the benefit hoped for may have been from causes entirely outside the operation. How long a filling will last, and how far it will protect the tooth, depends as much on its surroundings and the after-treatment as does the success of a surgical operation.

I have patients in whose mouths I will not place gold, on the same general principle I would refuse to invest a large amount in an uncertain venture. Not because their teeth will not bear it, but because their habits, the attention they give their teeth in the way of cleanliness, leads me to obey the scriptural injunction, "not to cast pearls before swine."

Fillings like other things will wear out; from changes in the mouth, the position and condition of the teeth, the force of mastication, and accidents to which they are always liable, they may be injured, or the teeth in which they are placed injured, and if not lost may require patching or repairs. This may happen to the best work, the best material, in the best mouths.

It is a great mistake to suppose, or lead the patient to suppose, that when a filling is inserted the matter is settled forever, and an equally great mistake to cry failure, failure, whenever a filling has ceased to protect a tooth. There must be some cause, and before we call the operation a failure it would be well to examine whether the cause is an avoidable one or not; whether the fault is in the work or the material; an error of judgment in the operator, or arising from some defect in the tooth, or condition of the mouth. If the filling has done all a filling *could do* under the circumstances surrounding it, although it may not have done all that *was desired*, it is not a failure. If it is lost or ceases to protect the tooth on account of a patient's neglect to give it needed care and attention, its failure is no reflection on the work or the material. The exhibition of a bottle or a dozen bottles of old gold or amalgam, or fillings of any other material, in itself proves nothing, and is no more a reflection upon the dental profession than a crowded cemetery is a reflection on the medical profession.

No one but the operator who performs an operation knows the difficulties encountered. A filling in an easy, accessible cavity in the mouth of a restless patient may be a far greater triumph of patience and skill than a difficult and complex operation for a patient who remains from beginning to end as quiet as a statue of stone. A filling that saves one tooth five years may be a greater success than another with a record of fifty. Individual cases amount to nothing as arguments; we can only judge of our success or failure, of the success or failure of gold, amalgam, or any other material, by the general results.

The author of the paper on the "New Departure" lays great stress on the number of gold fillings he has replaced with other material, but nowhere in that paper gives us any means of knowing whether they were failures or retired veterans; nor yet any knowledge of the character of those operations, what kind of gold they were made of, how it was used, or how and why they failed.

If any great number of those inserted by himself were made of "sponge" gold ("all the rage" twenty-two years ago) or Morgan's plastic gold, which he (Dr. Flagg) introduced in 1867 to the American Dental Association at Cincinnati in a long, earnest, enthusiastic, and eloquent address, stating that he had used it extensively,—the backbone of dentistry was broken,—with it ordinary fillings could be inserted in *less* than two minutes, etc., and recommending it as the best form of gold ever introduced to the profession: if any great number of sponge, or plastic, or fibrous, or *two-minute* gold fillings are included in the test-operations he refers to, we are not surprised that he is so thoroughly disgusted with gold as a filling material, nor that he should assign electro-chemical action as the cause of their failure. These forms of gold were readily worked into a compact and solid mass, but from the peculiar character of the preparation were difficult to make solid and secure close adaptation at the walls of the cavity. They were very apt to drop out bodily in from one to three years, from decay, not only around the margin but under the filling. They failed not from electro-chemical action, but from faulty adaptation.

What constitutes a failure is one of those vexed questions which cannot be answered by laying down any fixed, invariable rules. On general principles we may say a filling is put in with the intention of arresting decay; if it does not do so it is a failure. But before passing judgment upon it we must consider the material, how and where it was used, the destructive agents it had to resist, and the good it has done.

Why do fillings fail? Leaving out mechanical violence and bad workmanship, the advocates of the new theory have but one answer to this question,—incompatibility of the filling material with dentos, or electro-chemical action. (In the new word "dentos" we recognize a convenient technical expression equivalent to tooth-tissue, and, as we understand it, embracing and including as a whole the three tissues which make up the hard or bony part of the tooth.)

Having failed in all experiments to prove the existence of any electric current in the mouth, due to chemical action between the dentos and filling material, they endeavor to show that certain changes which sometimes take place after a filling is inserted are similar to those which *might be expected* if such a current existed.

Their reasoning simply stated is this: As an initial fact we have decay under or around a gold filling. It is claimed that decay is the result of chemical action. They now leave the mouth and refer to a series of facts well known in science. If two metals connected by a substance, a conductor of electricity, are immersed in a solution capable of chemically acting upon one of them more than the other, an electric current is set up. The invariable effect of this current is to intensify the chemical action in proportion to the strength of the current. Substances differ in their ability to conduct electricity; and it is found, other things being equal, that the strength of the current depends upon the conducting ability of the substance or metal not acted upon,—the better conductor gives the greater current, and therefore the better the conductor the greater is the increase of chemical action. They now return to the mouth, and find gold and dentos in contact in the presence of chemical action. Gold is a good conductor, and is not acted upon by the chemical agent; dentos is. Therefore, reasoning from analogy, they contend that gold by its presence hastens the destruction of the tooth. Gold fillings fail because of an electro-chemical incompatibility between gold and dentos. Gold fillings are failures; they are put in to preserve the teeth, but instead of doing so they hasten their destruction. They also offer as a confirmation of the new theory the assertion that they have demonstrated by experiment and observation, that among the substances used or suitable for filling teeth, they invariably find that the poorest (electric) conductors make the best fillings.

On this subject we refer to a single experiment.

Four copies of a large central tooth were cast in zinc and polished.

No. 1 was soldered to a copper wire five inches long, the other end flattened out, and the whole bent so that the flat part lay parallel with the face of the tooth and about an eighth of an inch from it, making virtually a Smee's battery.

No. 2 weighed forty-nine grains, and was suspended by a cord on the other side of the copper plate at the same distance from it, but neither touching or having any electrical connection.

No. 3, weighing fifty-one grains, had a copper rivet cast in it to represent a filling, and was suspended by a cord at a distance from the other, as was also No. 4, weighing forty-nine grains. These were immersed in the same vessel, containing a solution of one part sulphuric acid to twelve of water, and allowed to rest twelve hours.

When again examined, No. 1 and No. 3 were entirely dissolved, No. 2 had lost thirty grains, No. 4 thirty-one grains.

The object of this experiment was to see what effect the position of the copper would have, whether it would produce the same effect imbedded in the body of the positive element like a filling in a tooth, or arranged as in a galvanic battery. Judging from the volume of hydrogen given off during the first fifteen minutes it made but little difference. A second object was to see the probable effect of approximal fillings of different metals, but not touching. No. 2 was in the same relative position to the copper plate as No. 1, and lost one grain less than the zinc tooth suspended at a distance, probably owing to the rapid solution of No. 1 neutralizing the acid in its vicinity. We may say from this, there is no effect from approximal fillings of different metals in adjoining teeth when they are not in electrical contact, or, in other words, when they do not touch each other.

We draw deduction from this experiment guardedly, always looking upon initial experiments with distrust, and only refer to it at this time because it is a practical illustration, differing only in degree from what the electro-chemical theory supposes is constantly going on in the mouth. The copper rivet in the zinc tooth was as perfect a filling as it proved to be with the tooth a perfect galvanic battery. If we allow it to represent a gold filling in a tooth surrounded by the usual secretions or fluids of the mouth as an exciting fluid, then we may say, if there is in the mouth an electro-chemical action between dentos and gold used in filling a cavity of decay, whether that filling is solid or not, whether it is moisture-tight or not, whether it has perfect margins, finished smooth or left rough, are matters of absolute indifference. Do we find this to be the case in actual practice?

We may observe differences in different mouths. The saliva natural to one individual may differ in its conducting or exciting powers from that of another. We may notice differences in different parts of the same mouth. Those teeth constantly bathed with saliva will be affected more than those less exposed to its influence. Fillings in the same mouth, near together, in about the same relative position in adjoining teeth, and equally exposed to the saliva, should, with only very slight difference, suffer alike. Some little allowance may be made for the difference in teeth in the same mouth developed at different periods, and for accidental causes which may increase or decrease their vitality or power of resistance.

We may make great allowance for the right or left side, or front of the mouth, especially of the lower jaw; as there may be, and doubtless frequently is, great difference in the character of the fluids secreted by the parotid, submaxillary, and sublingual glands of the same individual. And when we remember how completely this secretion is controlled by that mystery we call "nerve power," and also remember the "nerve energy" of the two halves of the body is not necessarily equal or evenly balanced, we may expect difference both in the quantity and character of the normal secretions from the *several pairs* and from the *same pair* of glands; and therefore corresponding differences in the chemical effects produced.

This is in a measure indicated by the unequal distribution of tartar, and also in a measure by the unequal distribution of decay. But there should be very little difference between a crown filling in a short inferior wisdom-tooth and a filling of the same size on its buccal surface,—between the posterior and anterior approximal surface of any of the posterior teeth, and only a difference in degree between a crown and approximal or buccal filling of the same or an adjoining tooth. Do we find this to be the case in actual practice?

Again, there should be, and the advocates of this theory claim that there is, a great difference in the destructive effect corresponding to the relative electric position of the material used and the dentos. Gold should always, other things being equal, produce the most destructive effect, amalgam next, tin foil least.

Now, gentlemen, what is *your* experience as collated by actual every-day practice? Take, for instance, an equal number of as nearly equal operations as it is possible to find in actual practice,—of gold, amalgam, and tin foil,—in cavities equally easy of access, and produce fillings equally good of their kind in every respect. What will probably be the condition of the margin of those operations after an interval of, say two, three, or five years? I have watched this matter closely and attentively ever since I have been in practice, and judging from what I have seen of the behavior of these metals in the mouth, I should expect to see the gold and tin foil equally well preserved in all places where the fillings were not exposed to mastication,—in all places where they had to resist only those agents contemplated by the electro-chemical theory; while the amalgam would take a decidedly inferior position. If the experiment was extended to include gutta-percha and the oxychlorides, materials between which and dentos we can hardly conceive of an electric action, they would stand still lower in the scale,—many would be entirely gone after the third year. Gold and tin, so far apart in their electric relation as they are placed by the fathers of this theory, I have ever found to stand side by side, gold first (decidedly) and tin next, where chemical agencies were alone to be resisted, and amalgam, so loudly praised for its constancy, sluggishly bringing up the rear. This is to be expected, and is readily explained (we think) by mechanical rather than chemical laws.

This constant and invariable behavior of these three materials in all places where they have an equal chance, so diametrically opposed to that called for by the electro-chemical theory, seems conclusive evidence of its fallacy, and certainly should have more weight than any evidence yet presented in its favor, deduced from analogy or general principles, based on their behavior with other substances,—under other and far different conditions,—notwithstanding their "reasonableness" and "consistency."

Dr. Flagg's conclusion, drawn from the experiments on the subject referred to in his paper, so favorably undertaken both as to the men engaged and the means at their command, and yet so entirely and conclusively negative in their results, seems to place him in the large army of enthusiastic investigators who always find what they look for; whose active minds and vivid imaginations quickly supply any evidence their experiments fail to furnish.

We do not deny there are occasional instances of galvanic action in the mouth when different metals are brought in contact; this we know exists in isolated cases, and is sometimes the cause of discomfort. We have repeatedly patched broken-down teeth still retaining gold fillings with amalgam; allowing the two metals to be in actual contact with every chance for galvanic action, and have watched these cases year after year without noticing any effect on either the tooth or the filling. Occasionally in teeth with living pulps the galvanic action will cause pain, which is usually relieved by covering or coating the gold with mercury or amalgam. These cases are far too few to form any foundation for a theory; they are merely individual peculiarities, and have been noticed as such by dental writers for years.

If this theory presupposes a defect in the filling; if before the electro-chemical action begins its work there must be a defect, allowing the fluids of the mouth to enter between the filling and the walls of the cavity; if before the saliva becomes the conducting and exciting fluid of the galvanic battery it must stagnate, decompose, or change its character, then we reject the theory and all that belongs to it absolutely and altogether. There is nothing in it.

The conditions it requires are fully equal to the destruction of a tooth that has *never been filled.* The conditions it calls for are those which made, or helped to make, the original cavity, and are ever ready to begin or renew the destruction under or around a filling, no matter what it is made of. All that can possibly be claimed for it is that it accelerates the destruction, and this we resist on the ground that a cavity filled with any material that protects any part of the cavity, is just so much better off than a cavity entirely open. It may happen that a defective filling may prevent the free circulation of saliva, or by its presence interfere with cleanliness, and thus mechanically by its presence do mischief, and decay would under these conditions go on more slowly if it was out. But that its presence excites electro-chemical action, and thus makes the destruction more rapid, or that this destruction varies materially on account of the imperfect filling being of gold, amalgam, tin, gutta-percha, etc., we have as yet seen no evidence.

Probably further experiments may enable us to speak more freely at some future time. Of course when speaking of imperfect fillings we exclude those which are partially dislodged, we do not countenance bad work, we do not mean a "leaky" filling will save a tooth. We consider a filling simply a mechanical expedient to keep out of a cavity those destructive agents which have made the cavity. We recognize the value of gutta-percha, amalgam, and the oxychlorides, as well as gold; each article in its turn being best in that tooth and position it is best suited for. The differences in their behavior, we think, are due to mechanical rather than chemical or electrical causes. We think fillings fail or succeed more on account of mechanical than chemical compatibility or incompatibility of the filling and dentos; that failure is as often the fault of the patient as of the material or the operator. We conclude that fillings fail not from one cause, but from many; some entirely avoidable, some unavoidable, and others again like stepping on an orange-peel,—accidents, liable to occur to the most careful.

We have no doubt the electro-chemical theory will prove as great a boon to the operator in explaining to his patient why fillings fail, as fifteen or twenty years ago "the expansion of plaster" proved to the mechanical dentist explaining to his patron the misfit of "cranky plates." They are both scientifically ingenious, and of about the same practical value.

ALVEOLAR ABSCESS AND NECROSIS—SULPHURIC ACID VERSUS CREASOTE.

(Read before the New York Odontological Society, Nov. 21st, 1877.)

BY J. N. FARRAR, M.D., BROOKLYN, N. Y.

No. III.

(Concluded from page 422.)

HAVING shown that pure alcoholic solutions of sulphuric acid have little or no disintegrative power upon dead bone, and having learned from experiments with the "broken" solutions that this inefficiency is not to be attributed to the ginger or cinnamon, and that while the U. S. P. aromatic solution, *per se,* though practically powerless upon bone, is not quite so much so as that made from pure alcohol, and that the alcohol ordered by the U. S. P. (85 per cent.) for making it contains 15 per cent. of water, and knowing that the aromatic solution, though practically inert, may be made somewhat more active upon dead bone by the addition of water, and knowing that an aqueous solution containing the same per cent. (9.61 hydrated, 7.75 dry) of sulphuric acid has marked disintegrative power, we are forced to believe that it is water that causes the difference; therefore in a mixture of water with sulphuric acid, we have a more valuable bone-disintegrating agent than the alcoholic solution, though the latter may be valuable as a stimulant to promote an earlier establishment and perfection of the "line of demarkation" and the ultimate detachment thereby of the sequestrum from the living bone; but it has no practical disintegrative value if used in its pure state, and even if adulterated with water it has less disintegrative potency than an aqueous solution.

The explanation of the retarding or abortive effects of alcohol upon the disintegrative power of sulphuric acid is to be mainly ascribed to the fact that calcium sulphate, which is the product of the union of sulphuric acid and bone, though somewhat soluble in water, is wholly insoluble in strong alcohol; therefore, the first action of the acid, when bone is placed in alcoholic solutions, is to produce a minute film of calcium sulphate, which, though almost invisible, is sufficient to coat over and protect the bone beneath from being further acted upon.

Water being a solvent to this film, it will be seen that by diluting the alcoholic solution with it (water) the film is partially dissolved off, and a comparatively fresh surface is offered for further action. It necessarily follows that pure alcohol will interfere more with the action of sulphuric acid than if the solution be made with 85 per cent. alcohol. Therefore, the dilution of the aromatic solution with water may be expected within certain limits, though narrow, to increase the action by increasing its solvent capacity upon the calcium sulphate precipitate. This is an important point, since it teaches that, by the addition of water, aromatic sulphuric acid may be made to have some—perhaps a slightly practical—disintegrative power upon dead bone in the living organism.

Should the question suggest itself, Will not aromatic sulphuric acid act more vigorously on necrosed bone, on account of its porosity, than upon more compact bone? I would answer, Yes; but only in proportion to the increase of surface area caused by its porosity. We find this to be true in laboratory experiments; though not sufficient to destroy even the slender, sharp, needle-like portions commonly seen on necrosed bone, and so far as its action in living organism is concerned, is it reasonable to suppose that it would be much greater under so many adverse circumstances as have been suggested than when subjected to an unadulterated solution in large quantities continuously for seventy-two hours at 100° Fah.? The action of any solution of sulphuric acid, even of the strongest degree, upon dead bone, though of the most frail nature found in the necrotic state, is so extremely slow that even when under its use a cure results, the brief period of time required to accomplish it may sometimes be an evidence that there was no necrosed bone of the gangrenous variety present.

To illustrate: In alveolar abscess a cavity is formed in the alveolar walls—generally at the apex of the root—caused by the absorption induced by the growth of the cyst, or by disintegration, caused by the violence of the disease in the parts, forming perhaps that condition of death of bone which has been placed as the first subdivision of necrotic bone, viz., that "which has died, as in caries, illustrated in the soft tissues by ulceration." This state of things, when not of too long standing, and in a healthy organism, may sometimes be cured in four or five days, or even less time, by the use of any form of acid solution mentioned, but if there be a necrotic condition of the gangrenous type a cure in so short a period is impossible, except the necrosis be extremely limited.

Having thus gone over the ground of the action of the various solutions of sulphuric acid upon dead bone, of all varieties, and learned from these experiments that the aromatic form of sulphuric acid has little or no practical chemical action upon bone matter; that the same per cent. of sulphuric acid in an aqueous solution produces marked effect, and that water is a very necessary factor in these acid solutions, where it is desired to have it act to chemically destroy dead bone (of any variety), it now remains for us to consider under what circumstances we should apply these various solutions in order to obtain the greatest benefit from them.

If it be true that both solutions act beneficially, when and how should they be used? Judging from experiments with aromatic sulphuric acid, it is altogether probable that it does not act much, if at all, upon necrosed ossific tissue, but influences the living tissues through its tonic, astringent, and stimulating properties, as does creasote, though perhaps by a little different chemico-physiological action; and, in cases where necrosis is involved, the aromatic sulphuric acid probably has its value almost if not wholly in hastening the process of the line of demarkation; but while alcoholic solutions may be equal if not superior to the aqueous solutions in the earlier stages of the disease, they certainly have not the degree of disintegrative power desired. As the aromatic sulphuric acid does not have much antiseptic power, it is superior to creasote in cases where the exfoliation and discharge of the necrosed part is desired; for, though it does not disintegrate bone, it will not hinder the natural decomposition of the sequestrum by the normal and abnormal juices from the tissues, as creasote would do.

While it appears to be evident that an aqueous solution of sulphuric acid, in the strength that will not be injurious to the soft tissues. and in the quantity that is practical. does not cause so active chemical disintegration of necrosed bones in the living jaw, for reasons given, as if it were experimented upon in bottles, it is certainly probable —I think it is beyond doubt—that it does somewhat hasten its decomposition by direct chemical action. and is also beneficial by assisting in hastening the detachment of the sequestrum, in some manner, through the influence of stimulation upon the living tissues, thereby making it possible to accomplish results sooner by its use than by any other form of acid solution yet known, when used intelligently; thus indicating its claim to rank among the most valuable of medicines for the treatment of necrosis.

If what has been said about the aqueous solution be true, and if the disintegrative power of any of the acid solutions can be made of any value in dissolving necrosed bone in practice, what about the dead apex of the root of the tooth, should there be one involved? If this solution will act upon the dead bone, will it not act also upon the dead portion of the root? Laboratory experiments upon teeth show that it acts in the same way and to the same degree as upon bone.

On this card are fastened numerous specimens of teeth, and sketches of the appearance of some of them while surrounded by precipitates in the solution. If the object of the use of acid be to hasten decomposition of dead bone, then the action upon tooth-substance should be considered. Of course, I refer now only to the dead portion of the root, and in no wise assume that any of these acid solutions would injure a tooth whose root is covered with living periosteum. If the dead portion of the root is thus affected to the detriment of its future usefulness, is it correct practice to use an agent that will chemically disintegrate necrosed bone?

The first portion appreciably attacked about a tooth placed in an aqueous solution of sulphuric acid is the enamel, and the next is the end of the roots, and soon after the entire root, leaving the surface rough and uneven, and well fitted to cause irritation, if in the living jaw. To the question, Will this take place in the living jaw? I will answer, Does not the pus-detritus in an old abscess act upon the portion of the root within the sac, making it rough and ragged, and will not an acid that will act upon necrosed bone act also upon it? But the question may be asked, What shall be done, if creasote be not proper to use, on account of its antiseptic property, hindering, if not preventing, disintegration? In answer, I will make a classification of conditions, and the treatment will suggest itself.

First.—Abscess unaccompanied with necrosis.

Second.—Necrosis, *without* teeth being involved.

Third.—Necrosis, *with* teeth involved.

1st. Simple abscess, *without necrosis of the bone*, plainly calls, for reasons stated, for antiseptic (creasote) treatment.

2d. Where there is necrosis, with or without abscess, without teeth being involved, the disintegrative treatment by aqueous solution of acid is indicated, for it will probably hasten somewhat the disintegration of the dead bone, while it will also stimulate the surrounding living tissues to a healthier condition.

3d. In necrosis, with abscess, with teeth which have no living periosteum attached to the apices of the roots involved to protect them from the action of the acid, and as it is desirable to preserve the tooth, although a portion of it is dead, and, at the same time, to destroy and get rid of dead bone, creasote is not indicated; neither is the aqueous solution of sulphuric acid. The former will act as an antiseptic, and the latter will act upon the tooth if it acts upon the bone. Here we find use for the aromatic sulphuric acid, which will not injure the tooth, yet will assist in curing the diseased soft tissues in and about the seat of the former abscess, and though it will not act chemically much, if at all, upon the necrosed bone, it will probably benefit by hastening the line of demarkation, and permit the solution of the sequestrum by the normal and abnormal secretions.

From the foregoing considerations we may deduce the following conclusions:

1st. That the chemical activity of an aqueous solution of sulphuric acid upon dead bone and teeth is far greater than that of an alcoholic solution.

2d. That simple abscess, unaccompanied with necrosis, which is by far the larger class, indicates the antiseptic treatment—as it will cure the abscess and tend to preserve the dead root of the tooth involved.

3d. That necrosis, without teeth being involved, does not call for the antiseptic treatment, because it would tend to prevent decomposition of the necrosed bone; but does indicate an aqueous solution of sulphuric acid, which may or may not include certain other stimulants.

4th. That necrosis, with teeth involved, does not call for either antiseptic agents or the aqueous solution of sulphuric acid, as the former will tend to prevent decomposition of the dead ossific tissue desired to be disposed of, and the latter, if it can be used in sufficient quantities to promote decomposition of bone, will also chemically act upon and injure the dead root of the tooth involved. Such cases indicate a solution like the aromatic sulphuric acid, for, while it will stimulate the surrounding living tissues to a healthier condition, and permit, and perhaps, in a very trifling degree, hasten the natural process of decomposition of porous necrosed bone, it will not act upon the tooth sufficiently to injure it.

GOLD AND TIN IN CONJUNCTION.

BY D. D. SMITH, M.D., D.D.S.,

PROFESSOR OF MECHANICAL DENTISTRY IN PHILADELPHIA DENTAL COLLEGE.

(Read before the Pennsylvania State Dental Society, at Bedford Springs, July 30th, 1878.)

FILLING with gold or tin foils, separately used, has long been regarded by the dental profession as the method *par excellence* for rescuing carious teeth from the ravages of decay; but the conjoined use of these metals in the same cavity has attracted little attention and provoked but little discussion, though they have been used together to a considerable extent, but unfortunately without system and for reasons not always apparent. To simplify and cheapen the operation of filling, and doubtless, in some cases, the hope of interposing a more effectual barrier to the progress of decay, have been, it is believed, the main reasons for using gold and tin in the same cavity.

There are four different forms in which these metals have been and are thus conjointly used. These we will specify without attempting an especial discussion of the advantages and disadvantages of this mode of filling.

First. Tin foil packed in the bottom of cavities—usually large crown cavities—and covered with a sufficient thickness of gold to prevent cupping from mastication. It is thought that in this way fillings can be made in less time and with less danger to frail walls than with gold alone,—tin being more readily manipulated, more easily adapted, and condensed with less force than gold; thus lessening the time and expense as well as simplifying the operation.

In large crown cavities, and in many compound cavities involving the crown and the mesial, distal, or buccal face of a tooth, this method of filling has advantages over the use of all gold in the particulars named, and over the use of all tin in that the gold surface, opposed to the wear of mastication, maintains the integrity of the filling, while an all-tin filling, especially if it presents a large grinding face-exposure, soon becomes cupped.

Again, if the filling approximate a vital pulp, the tooth will be more comfortable—being less disturbed by electrical and thermal changes—if there be a considerable thickness of tin covering the pulp than if the filling be all of gold. If there be any advantage in the use of a filling material closely allied in its electro-chemical properties to dentine, the method is believed to possess this also. The only valid objection to the use of tin and gold in conjunction in the manner and cases alluded to, is the color resulting in some conditions and in some teeth. It will at times impart a color and an appearance difficult to distinguish from decay under a filling.

Second. Tin has been used as a lining for the walls of cavities, coming to the surface at the margins—especially the cervical margins—of approximate cavities, with gold as the main central portion of the filling.

The use of tin in this manner around the gold has been mainly in approximal cavities in bicuspids and molars, in an endeavor to combine in one filling the preserving properties of the tin with the density and color of gold. In fillings made in this way a dark line will usually appear in a few days on the tin at the surface, but no material discoloration of the tooth results unless the tin has been used to a greater extent than necessary in lining the cavity.

It has been objected to this method of filling, that gold could not be packed upon tin and a close union of the two metals secured; but there is no foundation in fact for such an objection, as the manipulations attending the use of tin and gold in this manner are even more simple, and the results attained more certain, than with the use of gold alone.

It only concerns dentists to inquire in this connection, Will a tin-lined gold filling preserve from future decay an approximate cavity in a bicuspid or a molar predisposed to caries, either from structural organization or from its surroundings, better than a filling of all gold? Both theory and experience would lead us to defend the affirmative of such a question.

Is it not the almost universal experience that tin in certain classes of teeth, commonly called "soft," "chalky," "poorly organized" teeth, is a better preservative than gold? If this be true, is it because of electro-chemical action taking place between the gold and tooth-substance when subjected to the varying conditions of the oral cavity? as from our present knowledge it would seem not unreasonable to assume. If we assume this, may we not reasonably infer that the electro-chemical action will be lessened, if not arrested, by the use of tin as a lining for the cavity, interposing a poor conductor, if not (after the discoloration of the tin) a complete insulator, between the gold and the tooth-substance? Are not the deductions on the electro-chemical theory—the arrestation of such action by this combination—favored by the fact that surface discoloration of the tin, in nearly every case, follows the filling of cavities in this manner? Experience shows that many apparently faultless approximal fillings of gold have failed at the cervical walls in from eighteen months to two years; and that when these same fillings have been guarded with tin foil, or entirely removed and tin-lined gold ones substituted, the teeth have been placed seemingly in a condition of permanent preservation. The experience of the writer is confined to watching a limited number of these fillings for two and three years, during which trial they have shown no signs of disintegration. More extended observation is needed before adopting positive conclusions.

The third and fourth methods in which gold and tin have been conjoined in the same cavity are esteemed less important, and are mentioned only for the more complete presentation of the subject.

Third. Tin foil rolled into pellets or cylinders; these enveloped in gold, of a thickness to meet the fancy of the operator, and used in the same manner as pellets or cylinders of all gold.

Fourth. Promiscuous packing of pellets of gold and tin in the same cavity; allowing both metals to come to the surface, giving to the filling a mottled appearance after a few days' wear. One case, a right inferior sixth-year molar; crown and buccal face filled, for a lad eleven years of age, having very soft teeth,—the only tooth the writer has ever treated in this manner,—has now stood a little less than a year, and at the present writing is in a perfect state of preservation, with no discoloration of the tooth. Dark lines and spots are to be seen on the surface of the tin; and a slight unevenness, which did not exist when the filling was first completed, exhibits the difference in the resisting power (density) of the two metals on masticating surfaces.

This method is not advocated as possessing any advantages over a tin-lined gold filling for such cases, but some combination of tin and gold is believed to be a better preservative in soft young teeth than all gold.

THE TEETH OF THE MOUND-BUILDERS.

BY T. S. SOZINSKEY, M.D., PH.D.

HAVING availed myself of opportunities to study the teeth of the Mound-Builders, I have prepared the following brief notes on the subject, which I think will interest many readers of the DENTAL COSMOS. A knowledge of the peculiarities of the teeth of these prehistoric people may not be of any practical value, but some of the inferences which may be drawn from a study of them are, not only interesting, but valuable. As some of my readers may not know anything definite about the Mound-Builders, perhaps I had better begin my paper with a few general remarks about them. They were the immediate predecessors of the Indians in at least the wide area of country lying north to the Great Lakes, south to the Gulf of Mexico, east to the Alleghany Mountains, and west to the Missouri River. There is reason for believing that the Toltecs, whom Cortez found in Mexico, were a remnant of the race. I say race, and it is likely I am wrong in doing so, for it is now held by many that there were several races existing contemporaneously, all unlike the Indian. An examination of the skulls found together could not but lead any one to believe that there were at least two races markedly different existing at the same time. I have seen two skulls taken out of the same pit or vault, one of which was quite as indicative of brain-development as any Grecian skull to be found in the Philadelphia Academy of Natural Sciences, and the other as low as the lowest of the savage Patagonian. They get their name from the peculiar structures called mounds, which are more properly vaults or pits, the erection of which is attributed to them, and in which, as a rule, are found human remains, and occasionally arrowheads, rude pottery, personal ornaments, etc. The mounds are numerous in Missouri, and each is on the top of a little hill, and is about eight feet in length, the same in breadth, and about three in depth. Some of them have an undressed stone casing, and each has an outlet. The popular opinion is that these mounds were used as dwellings, and Judge West, of Missouri, who has studied the subject thoroughly, was of the same opinion; but he informs me that he has recently come to the conclusion that they were merely places of casual refuge. These strange people have been extinct in this latitude over a thousand years.

The statements I am now about to make about the teeth of the Mound-Builders are made as the result of an examination of the teeth found in four pits which I, in company with many members of the Kansas City Academy of Science and others, including Professors Broadhead and Mudge, took part in opening a few weeks ago in Clay County, Missouri, and of the collection of the vigorous society just named. No set was found complete, but a number of them nearly so, and sufficiently so for most purposes of study.

In every jaw examined the teeth were regularly placed, except in two instances of molars, which were slightly out of line, and they were very close together,—in contact all around, as a rule. There were sixteen well-developed teeth in each jaw, with the exception of one odd lower jaw, in which there were only fourteen, there being two molars on either side; it was the jaw of an adult, according to all that have examined it. The canines were not particularly noticeable in any, but in all, I believe, the incisors were large and almost circular in form,—a very noticeable thing. The crowns of all the teeth were worn more or less flat, and to such an extent in many of them that they were nearly on a line with the gums. This gives the front teeth a very peculiar appearance. Not one tooth that I examined was either broken or affected by disease.

Now the Mound-Builders evidently lived on food that required much chewing,—likely it was for the most part, if not entirely, uncooked. It is scarcely possible that the principal portion of their food could have been flesh and yet their teeth be ground down as we see them; still, if they used it raw it required a great deal of grinding. They rarely tried their teeth on nuts or uncooked grains, for if they had done so it is more than probable that they would have been more or less chipped; but no such accident is apparent in any of those that I have examined. The incisors being ground down flat on the crowns, it would not seem that they were in the habit of dividing their food into mouthfuls with their teeth; on the contrary, it would indicate that it was divided into mouthfuls by some mechanical method. The front teeth, however, which are kept sharp by biting the food off into pieces, may of necessity have become ground down when the molars and bicuspids were ground off to a certain extent, that is, if we are to believe that in every individual the front teeth of the lower jaw met those of the upper directly, which at least in our race is rarely the case. But it may be they gave their lower jaw a peculiar turn in eating unknown to us, which would account for the truncated condition of their front teeth.

The dental profession was unknown to the Mound-Builders, and they had no need for it; for toothache and all diseases were troubles with which they were but very little acquainted. This tends to show that (as stated elsewhere by me) "from the wildest savages in whom they are sound and regular the teeth progressively deteriorate, and are at their worst in people in the foremost grade of civilization." There must be causes for this lamentable degeneration, and it is the duty of dentists to search for them and remove them if possible.

As the enamel of the crowns of the teeth of the Mound-Builders was absent for the greater portion of their lives, and yet the teeth remained sound, it follows that when a portion of the enamel is removed decay of the rest of the tooth does not necessarily follow. This popular belief is evidently incorrect. But it is probably true of the teeth of many at present in whom they are not perfectly sound and healthy from birth.

I might go on to remark on the soundness of the teeth of the Mound-Builders in spite of the fact that they were close together, in contact almost, if not entirely, all around in either jaw, and so on; but I need not elaborate on inferences or multiply them, as each reader can easily do so for himself.

PROCEEDINGS OF DENTAL SOCIETIES.

MERRIMACK VALLEY DENTAL ASSOCIATION.—"THE NEW DEPARTURE."

(Essay and Discussion at the meeting of the Merrimack Valley Dental Association at the Tremont House, Boston, May 16th and 17th, 1878.)

THE subject, "The New Departure," was opened by a paper by Prof. L. D. Shepard.

He said that for a number of years he had been gradually coming to the conclusion that as a profession we were not meeting to as full extent as we should the reasonable demand of the public that the majority, rather than the minority, of diseased teeth should be rendered safe and durable at our hands.

He read extracts from his report on Operative Dentistry to the American Dental Association in 1874, before the "New Departure" had been announced; at a time when it was quite dangerous to one's reputation to express a doubt even that the perfection of our art had been reached in the beautifully-polished, elaborately-wrought cohesive contour filling; to show his views at that time in favor of oxychloride, gutta-percha, and tin in preference to gold, in many cases where it was customary to employ gold; also, to show that for years he had been advocating for use in frail teeth methods which were quicker, easier, and less expensive to the patient.

He contended that the "Accepted Creed" as given in antithesis to the "New Departure Creed" is in the main a fair expression of the views of the profession at large.

To get at the "true inwardness" of the subject he thought that the ten articles of the new creed considered as a whole could be expressed under three propositions:

1st. The assumption that the filling of teeth as at present practiced, gold being mostly used, is not successful in its great object to arrest caries and prevent its recurrence.

2d. The promulgation of what is claimed to be a great underlying chemical principle which fully explains why one material or another is, or is not, adapted to arresting and preventing caries in teeth.

3d. Recommendation of a general modification of practice to accord with the newly discovered dominant chemical law.

Discussion of this subject should, he claimed, be limited to mouths with frail teeth and vitiated secretions. While the principles, if true, would apply in all classes of mouths, the limit of durability in the best mouths, with any material, is so extended that it is difficult to get reliable data, except by observations covering a long term of years.

Under the first division he said he did not see how any one who reads the literature of the profession, or attends its conventions, could fail to be convinced that in many cases gold had not been successful in securing the object of its insertion. Why this is so has been a prominent subject for investigation and discussion for many years. In fact, all improvements and modifications of practice have had their origin in the observation of this fact, and the consequent searching for a new and better way. Cohesive gold, the rubber dam, and all the list of inventions were joyfully hailed as an answer to the general inquiry.

If gold is sometimes successful and sometimes not, a consideration of the second topic, the reason why, assumes an importance measured only by the value of the teeth, the comparative extent of the failures, and the inestimable benefit of a solution which shall remove the evil.

He reviewed the various reasons and explanations of failure which had been advanced by our earnest observers and thinkers. He thought sufficient prominence had not been given to the fact that multitudes of teeth had been filled during the past fifteen years that previous to that time the most eminent and skillful dentists in the world never thought of risking their reputations by attempting to fill at all. He had heard one of the most celebrated of them say that when a tooth presented itself the durability of the filling of which was doubtful,—*doubtful*, he took the tooth out; did not leave it for any one else to attempt to fill,—"dead men tell no tales,"—as he had a duty to his reputation as well as to his patient. How opposite to this has been the prevailing sentiment of the past fifteen years! What if the result were doubtful! If the patient was willing to risk the trial, no dentist has hesitated to make the attempt, valuing his reputation as nothing in comparison with the patient's desires and his own enthusiasm in the conservation of teeth. As a result multitudes of teeth, pulpless, frail, cracked and more than half-way back to chaos, have been filled with gold, which would have far better been filled with some plastic material, or been *cured* by extraction. Cast out of the landscape these vast multitudes of hazardous operations, and our mountains of failures sink into mole-hills.

The third article of the accepted creed, "Failure in operations is mainly due to defective manipulation," is generally placed at the head of all the reasons. It is a very comprehensive, but very indefinite phrase. Each one's understanding of the phrase must vary with his system of manipulation. It is true that the difficulties in working gold are so numerous, so great, so insurmountable to any but the more gifted, that it is rare, very rare, to find one whose manipulation is invariably and uniformly perfect. The most skillful and healthful man is not always equally fresh and clear-headed. There are hours for all of fatigue and mental obscuration and bodily unhealth, which render imperfect the work of the usually perfect manipulator. It cannot be otherwise with our imperfect constitution, the exhaustive nature of our calling, and the inherent difficulties of gold-working. Considered in all its aspects, we must give to defective manipulation a prominent, perhaps the most prominent place among the causes of failure; and yet as we review the results of our extended practice, and find that in some mouths it seems as though a poor, soft, and miserable filling, put in under difficulties, and in positions inaccessible, performed its office infinitely better than what we regarded as a much superior operation in another mouth, we are forced to the conviction that defective manipulation is not perhaps, after all, the chief cause, but that there are conditions connected with the tissues upon which we operate, the position of the cavity, the fluids which surround it, and the general health of the patient, which assume a prominence overriding all questions of manipulative ability and thoroughness, and sometimes forcing us in humility to confess that our art itself is a failure, and that all efforts to save such teeth with gold fillings are futile and wasteful; and when with such a mouth, we find that the so-called temporary materials introduced perhaps in our despair proved to be, as the seventh article of the New Departure Creed has it, "the most permanent filling material we possess," that these "poor gutta-percha fillings (Art. VIII.) in their proper places were better than good gold ones," we have thought that their ease of manipulation was not all that there was in their favor, but that there was something in the material itself which made it a better filling material for such cases than gold.

Such an experience as the foregoing is sufficiently common to explain the avidity and pleasure with which the profession have received the enunciation of the new chemical law, which, if true, settles all the doubts which have so long oppressed us, and furnishes an accurate and philosophical foundation upon which to build the practice of the future. The article of the creed founded upon this law is No. 3 of the creed, which reads, "Failure in operations is mainly due to incompatibility of filling material with tooth-bone."

The same guarded expression, "mainly due," is used in this article as in the article of the accepted creed in regard to defective manipulation. It does not deny that there are other causes, defective manipulation among them, but simply places at the head of all the causes the great explaining cause, "incompatibility of filling material with tooth-bone." This is the one great idea of the New Departure; all the other points mentioned are subordinate to this, and rest upon it as a foundation. If this is true, the other statements are true or false as they accord with this or not. All materials are to be judged by this standard. We have thus offered a new gauge by which to test all materials. Heretofore there has been no general principle, except, perhaps, the one which deals with the water-tight closing of the cavity. Materials have been judged by their facility of adaptation to the walls so as to perfectly exclude all ingress of destructive agents.

We have here introduced a new principle; that the material itself, by some law inherent in it, when in juxtaposition with tooth-bone, has a tendency either to increase or arrest chemical changes in the tooth-bone itself. It is a mark of professional progress, for which the profession is to be congratulated, that after so long a period of mere empirical observations of facts we are beginning to discuss principles founded upon the immutable laws of chemistry and philosophy. Whether true or false, such a discussion will do great good, and after a time, if not now, we shall evolve the true law. As I said before, the statement of incompatibility is claimed to be founded upon a chemical law. We are told by the advocates of the New Departure that it is a law of chemistry that there can be no chemical action anywhere between any materials without the evolution of electrical activity or a current of electricity or galvanism. I do not profess to know enough of this subject, which at present is universally acknowledged to be in its infancy, to discuss it as its importance demands. The claim may be true or false. Its advocates have studied the subject with much praiseworthy devotion, and their opinion is certainly entitled to respectful attention. It is an old theory that chemical action is going on in the mouth, that decay is partly or wholly a chemical progress; certainly that whatever other changes are taking place there can be no decay without chemical action. It is now asserted that a galvanic current is always the result of the chemical action, or, I should say, a part of it. What is a galvanic battery? Dr. Shepard here quoted from several authorities of eminence. We have room for but one:

"A simple galvanic battery consists of two bodies relatively electro-positive and negative, immersed (or partially so) in a fluid which tends to act chemically on one or both; the metals touching each other or having a conducting circuit connection.

"Or, a current may be obtained from two liquids and one metal (or other substances); the respective sides of the metal being exposed to liquids of varying chemical energy upon the metal so presented. Chemical action in all batteries develops electric energy or electro-motive force. This power is derived from the expenditure of metal, etc.

"Two substances which are conductors of electricity being placed in contact, and subject to chemical action by the presence of a fluid, will develop electric action; negative electricity passing from the body which is acted upon most powerfully,—the more easily oxidizable metal,—and positive electricity from the other substance. This is not stated as a principle, but a fact.

"The metals, etc., are arranged in a series, each one of which is positive to all below it on the scale. The order is as follows:

Zinc.
Lead.
Tin.
Antimony.
Iron.
Brass.
Copper.
Silver.
Gold.
Platinum.
Graphite.
Charcoal.

"The more remote they stand from each other in the series, the more energetic will be the electric action developed by their contact under circumstances to excite chemical action.

"In the formation of a simple galvanic circuit the chemical action which excites electricity takes place through a decomposition of the liquid."*

Now it is claimed that gold is negative to tooth-bone, and hence that as a result of the chemical action of the fluids of the cavity, the tooth-bone being acted upon most powerfully, the gold not at all, the tooth-bone is itself wasted or used up in the process, while with other materials, such as gutta-percha, tin, amalgam, etc., the tooth-bone is negative and these materials are positive and acted upon most powerfully and themselves decomposed. Or, as in gutta-percha, that the two are so little remote from each other in electrical excitability that there is almost no action at all, while with gold they are so far apart in the series as to give rise to the greatest activity. They explain the universally observed preservative effect of tin by saying that the tin, being positive, is decomposed on its entire surface in contact with the tooth, and that the result of this decomposition is to form a layer between the tin and tooth which is a non-conductor, separating the two and destroying the battery. That this also is the case with amalgam. In proof of which we all have noticed the black color of the surface of the amalgam in contact with the walls of the cavity and the staining of the walls. After this decomposition has taken place and the barrier is formed, the battery is destroyed and all action ceases. The tooth remains free from decay.

As I said before, I do not profess to understand this subject well enough to express an opinion upon it; I do not know any one who does. It is still a matter of theory, resting upon the assertion of those who pretend to have investigated it by years of patient study and experiment. It certainly is a most interesting theory, and when examined in connection with the facts of decay, which we have all observed for years, seems to be sustained by such facts.

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* Knight's Mechanical Dictionary, edition 1877, page 937.

I do not consider it necessary to demonstrate the theory of the electric action. It is said to be impossible to do so. Many theories which have been accepted by scientists have not been demonstrated, nor could they be. They are accepted or rejected upon the accumulated observation of facts and phenomena. Upon the observations of the past have been built certain theories in regard to the teeth, their diseases, and their proper treatment. It is no new thing for theories respected for ages to be cast aside for new theories; the same facts and phenomena upon which the old was founded doing service for the new. It is our duty to try this new theory by the crucial test of all known facts and phenomena with fresh observations and investigations. It will soon be established or cast aside. Its study, at present, is interesting.

The third division deals with the question of a general modification of practice to accord with the new theory. The discussions which have taken place since the announcement of the "New Departure" seem to hinge almost entirely upon this question. As given to us by the authors, I can see in it no "New Departure." They do not give us a single new material. As far as practice is concerned, all they advocate is "a difference in degree." The degree to which they go may be new to them, but it is not new to many of the profession. Nearly all of our most useful men have for the past few years used more or less of all these materials. It would be difficult to find a prominent dentist who has not used largely oxychloride of zinc and gutta-percha. He may have called such operations "temporary fillings" or "preparatory treatment for gold." While the use of amalgams has increased to a wonderful extent with multitudes of the profession, being almost the only material they have used, what new departure in practice can such make if they adopt *in toto* the new creed? They can truly say that the authors of the "New Departure" have simply come over to their side and added their influence to theirs to make the use of amalgam respectable and first-class. I think it greatly to be regretted that the discussion upon this whole question has seemed to be limited to the narrow question of amalgam. As I have said before, the one great new idea about it is the "theory of incompatibility," founded or not, as the future will demonstrate, upon electro-chemical action. If this theory is true, the question for us, as far as practice is concerned, is still an open one, not yet decided;

we have simply a new test by which to try all present and forthcoming materials.

It is also to be regretted that so little mention is made of so highly an electro-positive material as tin, which under the new theory merits the highest place among preservative materials, a place it used to hold, but has lost among most practitioners, not from any demerit of its own, but, I fear, because it demands skill to successfully use it. I do not think it true that "the accepted belief was, *and is*, that it (tin) did so (save teeth) because of its softness and ease of manipulation."* In the report to the American Dental Association to which I referred, I used these words in regard to tin, "its apparent antiseptic or corrective effect upon tooth-tissue," not as anything new or original, but as an accepted belief of the profession, as the words "old practitioners know this is true" would imply. On the same page you find "we have here in tin and gutta-percha the best weapons with which to lessen the amount, some ton and a half, of amalgam, which is used every year in the United States for fillings."†

I close with two extracts from the same report, page 95:

"During the past four or five years, however, the question has year by year been forcing itself with increasing urgency upon my attention,—what is best for the patient; by what method and with what material can his teeth be saved with the least expenditure of suffering on his part and of time or money? This important question implies that the interests of the patient are paramount to those of the profession, and should, I think, underlie our every effort, and accordingly as any method or material answers, it should stand or fall. Let us seriously ask ourselves whether in our earnest striving after perfection of operation we may not somewhat have lost sight of it, and to a certain extent proceeded as if the patient had no rights which the dentist was bound to respect."

And page 99:

"It has been often said that any tooth which can be filled at all, can be and should be filled with gold. To this statement I take exception most emphatically. I think there are many teeth and some of them comparatively easy ones to fill, which a regard for the welfare of the patient, as spoken of before, demands should be filled with other materials than gold. For example: I would recommend tin as more justifiable than gold for most cavities in the grinding surfaces of molars, when the antagonizing tooth is gone, and hence not subjected to attrition in mastication. The same material should be used in many proximate cavities in molars and bicuspids, especially when they stand alone and have strong walls. I need not enumerate the gain in the time and pain saved to the patient, and the very low caloric conductivity of tin, its apparent antiseptic or corrective effect upon tooth-tissue, and so forth. Old practitioners know this is true, but such has been the frenzy for the beautifully polished cohesive filling that this material, second only to gold, has been swept into almost total disuse, to the injury of the profession and the defrauding of our patients."

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* Dr. Flagg's remarks on Article V. of the creed.

† Trans. Am. Dent. Assoc., 1874, p. 100.

DISCUSSION.

Dr. S. J. McDougall, of Boston, stated a case where an amalgam filling inserted by a dentist in his own mouth had remained good for forty years; and another case where a gutta-percha filling put in by one not a dentist had preserved the tooth for twelve years.

Dr. I. J. Wetherbee, of Boston, was inclined to ask, Is this a "New Departure"? Have not teeth been filled for a hundred years with amalgam, and have not these teeth stood reasonably well? Have not teeth been filled with gutta-percha ever since it came into use? Have they not been filled with oxychloride ever since it was placed upon the market? And have not teeth been filled for more than a hundred years with gold, and has not gold maintained its character as a material suitable for filling teeth? We have been informed that the New Departure lies mainly in the fact that we have now come to recognize that chemico-galvanic action is the chief factor in the destruction of the dentine of teeth. Now, in a perfectly inserted filling, the margins being perfect, and the enamel coming in apposition to the gold, what opportunity is there for any action whatever between the gold and the enamel? In this fact of the gold being in positive apposition, and the walls of the cavity being made absolutely tight, we have an estopper of all this nonsense about electro-chemical action upon the dentine, because of the presence of the gold. It is asserted, however, that when the filling is not tight, when the cavity cannot be hermetically sealed with gutta-percha, still the filling with gutta-percha, with all its leakage and with all the space around it, will preserve a tooth for a longer period than a filling with gold that is tight.

If there be, however, this electro-chemical action going on, will it not be equally fatal whether gold is there or not? The gold has nothing to do with it. A tooth, when the filling is leaky, will decay in spite of your gutta-percha, oxychloride, or amalgam. But gold fillings are not all perfect; but that they are not all perfect has nothing to do with the question as a scientific fact. That teeth filled with gold have stood thirty years is conclusive evidence that the fault is not with the gold, nor with the dentine, because of incompatibility.

But the manipulation is sometimes imperfect, and if there is a leak of the five-hundredth part of an inch, in the course of time the tooth decays at that point, not because of the presence of the gold, nor of any incompatibility between the gold and the tooth, but because the fluids of the mouth have access then to the dentine. Is it a fact, however, that a majority of fillings fail in ten or fifteen years? That there are some such failures may be true, but they are the rare exceptions, and not the rule. They belong chiefly to a class of teeth that stand by the side of other teeth not decayed at all, and yet, though perfectly filled, five years afterwards you will find the tooth decayed that was sound five years before, as well as the space between the gold and the cervical wall of the tooth previously filled.

In many cases of amalgam-filling the teeth decay around the edge. In these cases it is denied that there is an incompatibility between the amalgam and the dentine. But the fact is, that such is the character of the material of which the amalgam is made, that it naturally unites with the fluids of the mouth and rots the tooth, and the tooth goes on decaying.

In most mouths oxychloride will not stand more than two or three years; in some not even one year. He uses it only for covering exposed pulps in connection with other materials. Gutta-percha or Hill's stopping is a very good filling where there is no attrition. It will stand for a number of years in a good many mouths, but it is true that in some mouths with an acid reaction gutta-percha will be dissolved. You will find the surface lifting up, disintegrating, and the periphery of the cavity exposed to decay. To say that it prevents decay is the height of folly.

Dr. R. R. Andrews, of Cambridge. As he understands, the so-called "New Departure" is to teach us that by reason of certain electro-chemical causes gold is not a safe filling for *frail teeth*, but that gutta-percha, oxychloride of zinc, and amalgam will do better with this class of teeth than gold. His experience teaches him that gutta-percha carefully worked in places not exposed to wear will last remarkably well, and that there is not the danger of decay around the filling that there is from gold and amalgam. Oxychloride of zinc in crown cavities not only makes an excellent filling, but, as a preparatory filling in young teeth, will in many cases cause the dentine to become of flinty hardness. Amalgam in some cases answers an excellent purpose, but should be used with caution in this class of teeth. The strongest section in the New Departure Creed to his mind is the fourth, viz.: "A tooth that can be so treated as to be satisfactorily filled with *anything* is worth saving."

A case of his, the lower molar roots, with the front wall standing, where he urged extraction, was saved, at the urgent request of the patient, by using a silver band, some gutta-percha, and amalgam. It articulates perfectly with the upper molar, and has now been in hard service four years. He is in the habit of using preparatory fillings of gutta-percha and oxychloride, and is usually surprised at the good condition in which these fillings come back to him.

Dr. J. H. Kidder, of Lawrence, thought it simply a question of fact. What we want to know is, What is the fact?

Now in regard to the practice of dentistry, we have been going through a series of experiments, and we want to know what is the result of those experiments. We do not care about any theory of compatibility or incompatibility, about galvanism or electricity, but simply, What is the result of our work?

As to his own experience, he had been in practice twenty-six years, and had used plastic fillings largely; and a brother of his, who commenced practice some twenty years before he did, was accustomed to do the same thing. Both have used plastic fillings from the beginning, because that line of practice had seemed to be approved by the results of observation and experience. And he was willing to make this assertion,—that the only objection to amalgam is its color. There is no other kind of filling by which you can save teeth as well as you can by amalgam, and wherever you can keep the filling out of sight, it is the best for you to use, and the best for your patients; of course, the color is such that you cannot use it in front teeth; it will disfigure them, and you cannot use it in any place where that is an objection to it. What he wanted to know was whether amalgam would save the teeth or not, and he had laid this down as a general rule, "Fill all proximal surfaces, back of bicuspids, with amalgam if you want to save the teeth." We cannot always carry out this rule in practice, because we must humor the whims of our patients.

He had not had as much experience in the use of gutta-percha as some others, because he had had more confidence in amalgam. He had filled a great many large cavities in dead teeth with amalgam by first lining the cavity with oxychloride. You could not tell to-day what these teeth are filled with; the color is just as perfect as it would be with gold. He believed they would outlast any gold filling that could be put in.

Some ten years ago he had written to the dental depots to ascertain how much amalgam and how much gold they sold to dentists; and he found that then about six times as much amalgam was used as gold. So that the present "departure" is not so much a "New Departure" as it is simply an acknowledgment by gentlemen whom we call leading dentists of the results of their experience.

Dr. C. G. Davis, of New Bedford, said that there was a certain class of teeth that did not stay saved after he thought he had saved them, and these were the teeth that we are sent out to save. He had not been taught to expect such a result, and had been sadly disappointed. Dr. Flagg, on the contrary, states that he has brought up thirteen hundred people, and that all those arches remain perfect after years and years.

The following letter from Dr. Flagg to Dr. Davis was then read:

106 N. ELEVENTH ST., PHILADELPHIA,
April 27, 1878.

MY DEAR DR. DAVIS.—The character of even the limited correspondence which has had place between us has awakened within me a much more than ordinary desire to communicate with you upon those subjects which, having been a "life-work" with me, and having proven of great satisfaction, *and increasingly so*, as I have journeyed onward, are naturally very near to my heart.

We are both "old practitioners;" we both can say, with mingled feelings of pride and regret, that we have been in the harness for "more than a quarter of a century!" and thus it is that I go out toward you with more of affection than of discussion as we talk together of our "record of the past."

I do not know of any paragraph in any of the hundreds of letters which I have received in relation to the "New Departure" that has more *seriously* impressed me than the evident solemnity with which you regard the statement of my "unbroken arches," and the *strange* sadness with which you say you have *not one.*

"Not one!" it made *me* feel *cold* as I read it: it made me feel as though I *must have you right on here*, that you might *see* that (whatever it might be) which would be a balm indeed, and which it seems so very *strange* to me that you seem to need.

"Not one!" *That*, to me, would be overwhelming from *almost* anybody, but (in turn) "from you it's a 'stunner'!"

Three of the "five teeth" referred to were "neuralgic" teeth; teeth that were *beautiful to look upon*, scarcely touched by caries; teeth which I had *made comfortable* and *then extracted* because I was afraid of life-long trouble if they ached again; and the other two were sixth-year molars, which had struggled against all kinds of difficulties from early life, and finally, in adult years, succumbed, necrosed.

And I thought *this* was ONLY *not so bad!* and spoke of it "thankfully" and really without such thought as you seem to have given it. But *you* have made me think more of it: *you* have made me *wonder* if "plastic filling" had done *even more* for me and "*mine*" than even *I had thought!* The only difference that I can note between our modes of practice is, that you were filling *conscientiously* more and more earnestly, and more and more carefully "*with gold*," while I have been just as *conscientiously* filling more and more earnestly and carefully "*with plastic.*"

It may be that *doing thus* I have had *more energy left* to bestow upon the "working up" of the "treatment of teeth," but my steps have been so led as that for *twenty years* I have *abandoned gold* before the teeth became *anything near hopeless*, while *you*, perhaps, have followed in the path of *gold-renewal* as the "BEST" (that *fatal* rock!) until NO MAN, even with "*temporary*" gutta-percha or "*vile*" amalgam, *could regain that which he had lost!*

Think on this sentence as you would upon the choicest words that I *could* send you.

I BELIEVE *this is the* KERNEL *of the nut!*

Article II. Accepted Creed. Either "contour filling" or "separating teeth" is the best method to arrest decay.

Article II. New Departure. Neither "contour filling" nor "separating teeth" has much to do with the arrest of decay.

You ask how this can be when "isolated" teeth are proven to be so very much more exempt from decay than are those which touch.

I reply, nothing is said of "isolation" as both you and I understand this term.

By "separation" as a means of arrestation of decay, we mean the filing, chiseling, or disking of teeth apart, denuding them of their enamel, filling them with a circumscribing ring of exposed dentine around the filling, and so shaping the approximal faces as to insure a (so-called) "protective" separation.

The correctness of this practice, *theoretically*, we partially admit (only partially), but *practically* we find it, just as you have found it, *not to work satisfactorily.*

We also find, just as you have found, that decay goes on at the cervical edge of fillings, *made in contour*, both of gold and of amalgam, and even of gutta-percha, and *most notably* of those of oxychloride of zinc; but I have *not found my* amalgam or gutta-percha fillings fail thus as frequently as I have found *my* gold ones. I will only say of the gold fillings *of others* that have come under my notice, that theirs and mine seem to "*train in about the same company.*"

Now this again, I think, must be because I have filled largely with amalgam and gutta-percha *before* the teeth have become so *desperately* bad as to *drive you* to "plastics."

I have given up gold with the thought, "Well, as gold don't seem to do, we will try something that *promises better.*" While *you* have *given up gold* as an abandonment of the "*best*" at the *last moment*, and have "gone to sea" in an "open boat" rather than absolutely *sink* with the *noble ship!*

Do you see *nothing* in this?—nothing!—where I see *everything?* And if *you do* see *nothing*, and *I do* see *everything*, is it not possible, nay, *probable*, that a middle (*truly middle*) course would be *far better?*

And is not this *middle course that* which I urge upon you to adopt?

You ask in relation to the cavities of decay in the mouth which never had had any dental interference, "Is this due to electro-chemical action?"

Most certainly it is the result of vito-chemical disintegration with its concomitant electric disturbance, but this has nothing to do with the electro-chemical action of *filling material* upon tooth-bone.

We contend that so soon as a *gold* filling permits of leakage (notably), tooth-bone is broken down more rapidly, from the presence of the filling, than it would be without it,—just as a decomposing seed in a cavity would accelerate decay,—the one, from its high conducting power, electrically, the other, from its evolution of acidity during decomposition.

But while we thus make our argument *against* the use of *gold* in large and *inaccessible* cavities in frail teeth, where *leakage* is almost unavoidable, we, on the other hand, argue for the employment of filling materials lower in the scale of "conductivity," as tin, or lower in scale of conductivity and possessed of the quality of easier adaptation or "plasticity," that thus, through the combined media of closer adaptation and greater electric and chemical harmony, increased assurance of service may be attained.

And now let me say, that only the first page of this book of "plastic filling" has been opened. *Plastic filling is a tolerably well-worked up* SPECIALTY *of dentistry.*

It would, already, require for its elucidation *more talk* than has been given to the relative merits of the *thicker* and *thinner grades* of foil!

It would, already, require more thought than has been bestowed upon the relative merit of *soft* and *cohesive* gold. It would require far more discussion than has been given to *serrated* and *wedge-pointed* pluggers!

It now *demands*, and *more time will be accorded it*, than *has been given* to the settling of the *dental status* of the "noblest of the metals," for in the dental scales *it* has been *weighed* and *found wanting*, but the "weighing" has consumed *almost a century*.

You have been one of the weighers,—*I* have been one of the weighers,—but those who have most *groaned* under the weighing are those who, as the result of our *gold efforts*, count their time, their money, and *their teeth* as among the things that *were*.

With the kindest regards, I remain,

Yours fraternally, J. FOSTER FLAGG.

Dr. C. H. Osgood, of Boston, said a number of years ago the writer of the letter just read made the statement before the American Dental Association that he could fill a tooth with gold in two minutes or less under water. That being his practice he was not surprised that he should have abandoned it and adopted the use of a material more easily manipulated. As he understood the "New Departure Creed," its supporters do not claim for it that the use of plastic filling materials is new, but they do claim the discovery of the electro-chemical theory of the action of filling materials which is more fatal to tooth-structure when gold is used than any other material; also, that a filling may be the best that is known for the tooth and yet leak badly. He thought the reason why seemingly leaky amalgam or tin fillings preserve teeth was not that the material prevents electro-chemical action, but because the salts of these metals line the cavity, penetrate and hermetically seal the tubuli of the dentine, thereby protecting it from the action of the acids of the mouth (being insoluble and impervious to them). This is the reason, and the only reason, why leaky fillings save teeth. When gold fillings become loose from decay around them, it is not always from faulty manipulation, nor can it be wholly attributed to electro-chemical action caused by incompatibility of filling material, for we have the same conditions surrounding the teeth which caused the decay at first. Why should we not expect the same result? If gold produces this electro-chemical action to such an extent that "teeth *melt* from the gold like snow before the sun," why does it ever perfectly preserve a tooth while its neighbors melt?

Dr. T. D. Shumway, of Plymouth. The theory most generally adopted by the dental profession has been, that decay of the teeth is owing to the acid condition of the mouth. Now, in regard to this "New Departure," that which entitles it to be called "new" is simply this, that there are electro-chemical changes that take place in teeth filled with gold, by reason of the juxtaposition of the gold and the teeth. It is said, then, that gold is the most dangerous metal that can be employed for filling teeth when preservation is the sole object sought by the operation, for the simple reason that gold excites electricity, and that that produces chemical changes which result in decomposition of the teeth.

Now, the objector says that that cannot possibly be true, but that our failures result from imperfect manipulation and the deterioration of the teeth. If this latter statement be true, what should be our method of practice? For the last twelve years we have used the teeth as though they were made of a good deal better material than they were a hundred years ago. We have been applying power in putting in fillings that the teeth would not have stood a hundred years ago; and still, teeth are not as good as they were then.

He believed, and his observations went to show, that the method of practice which has been in vogue for the last fifteen years is what has driven certain men to adopt what they call the "New Departure." There could be no material difference between gold in the soft or non-cohesive form and tin foil; and if you put tin foil in a central incisor, for instance, on one side, and soft gold, as it was manipulated twenty or twenty-five years ago, on the other, they will both stand equally well. But if you put tin foil on one side, and pound your gold in on the other, the tin foil will stay there long after your manipulated filling has ceased to be.

This "New Departure" had certainly one merit, and that was the merit of a theory. Dentistry had been without a theory. The way in which they claimed there was a "New Departure" was simply putting it upon scientific grounds.

"I know by reason of my experiments. I have experimented so and so, and I have kept the results of my cases so and so. As the results of these I am prepared to propound and promulgate a theory, and that theory is in keeping with the facts as I have stated."

Dr. D. S. Dickerman, of Taunton. If Dr. Flagg were in Taunton, and should make such an assertion as that he had out of thirteen hundred patients lost only four or five teeth, we should consider him a maniac or a fool, it would make very little difference which, and he might find some apartments in our hospital. No kind of filling will always preserve the tooth. If the cause of its decay is not removed it will continue to decay. Gold filling does not require to be made very hard: only to be perfectly adapted to the tooth-substance.

He had teeth that were filled with gold thirty years ago that were now just as good as when filled, and the filling was so soft that he had put an excavator through it. Why did those fillings preserve the teeth? On account of the nice adaptability to the tooth-substance. That is the test. He did not call this a "New Departure." There were few dentists who had not used all manner of plastic fillings to preserve the teeth.

Dr. E. B. Goodall, of Portsmouth. Many people never go to a dentist or take any care of their teeth, and yet they are perfectly good. But when we step outside this grand old stock we find a complication of difficulties with the teeth. Experience teaches that tooth-structure has deteriorated. In his early practice he put in amalgam fillings, and some of them, after fifteen years, showed the teeth perfectly good and strong. He had lately seen a tooth filled on the grinding surface with good old-fashioned non-cohesive gold, forty years ago, that was apparently as good as ever.

This argues only one thing, that there are teeth that will last filled with almost anything except gutta-percha. He did not believe, as a rule, that that would last more than two years without being renewed. In one case the buccal surfaces of the teeth below the gums had decayed, and the enamel disintegrated. These are very painful cavities to fill. He had been in the habit, where such cavities were shallow, of touching them with nitrate of silver, which hermetically seals the tubuli, and stops decay just as effectually as any filling. A tooth cannot decay as long as it is hermetically sealed; but whether filled with gold, or gutta-percha, or touched with nitrate of silver, just as soon as the enamel is destroyed beyond the filling then the tooth decays.

Dr. G. A. Gerry, of Lowell. The "New Departure" teaches us that plastic fillings are used to preserve frail teeth, teeth that will not bear filling with anything else. Now his quandary was, When does a tooth cease to be a frail tooth and become a hard tooth? If plastic fillings will save frail teeth, will they not preserve hard and strong teeth?

Dr. T. H. Chandler, of Boston. Dr. Flagg reasons in a circle. He begins with chemistry, and from that gets his electricity, and from that chemistry again, and so round and round in a circle. If we admit his premises we may have to admit his conclusions, but he was not inclined to admit that sort of a premise. As to his facts, there may be no intention to misstate them, but some stories are so large and told so often, that the teller gets impressed with a belief in them, though they may have but a slight foundation in fact. Dr. Chase gets his chemistry from his acids, and then his electricity from the action of his acidulous fluids. According to Dr. Palmer, the tooth-substance and any metal can make a battery. But to make a working battery both substances must be connected by moisture. A tooth with a perfect filling is a dry battery, and there can be no voltaic action till the moisture is let in. There may possibly be a slight action outside, where the elements are in contact in acid secretions. Why look for another cause when a sufficient one is here right at your hand? This very acid secretion will do the business without any electricity. Dr. Palmer, however, is a little doubtful whether gold may not be used in a majority of cases, and may not in such cases be just as good or a little better than amalgam or gutta-percha. No doubt every sensible dentist uses and has used more or less of all these plastic fillings in proximate cases; but the conclusion does not follow that because these fillings are good for poor teeth or in difficult places, therefore we should use the same material for good teeth and in easy places. We should regard the appearance of our patients' mouths, and not leave them looking like coal-holes. Our modern amalgams have not the preservative quality of the old, which were due to the copper salts which they contained. The expansion of our amalgams, too, has the effect of leaving a rough edge for the retention of fluids and food, which is a nest for fermenting and acidifying processes and so is injurious. The same must be the case with gutta-percha, which wears out, exposing the enamel and dentine, and making pockets for the same substances. In an examination of many wretchedly poor teeth he had sought to save by all the methods and materials he knew, the result has been favorable to the gold, which has saved more and better than the amalgams.

Dr. G. F. Waters, of Boston, explained in a very interesting manner the growth of fungi, lichens, etc., the cryptogamous plants, and how, unlike the phænogamous plants, they give out carbonic acid in great abundance. "If we have looked into the cryptogamous plants," he continued, "and have seen how they grow and get their soil; how lichens, for instance, that grow in hard rocks, are enabled out of those very rocks to elaborate the soil in which they shall grow; when we come to know the enormous number of the fungi that pervade our food, all our nuts, all things that enter our mouths, even the fluids that we take, we may conceive that some of these may find lodgment, may find a nidus, where it may start and grow, and out of the hard, obdurate enamel make for itself food and prepare a place for the dentist to work afterwards. Now, it seems to me that this is one of the causes of decay in teeth, and that this cause may be present, no matter what kind of a filling you have put into the tooth; but if you have a tin filling in the tooth, the tin will partly break down under the action of this acid (the product of the fungous growth), and so much of the acid as spends its force on the tin is saved from the tooth; if you have gutta-percha there, or amalgam, then so much of the acid as spends its force upon these will not act on the tooth; and that is the simple reason why one of these materials may be better than a gold filling, because in the case of a gold filling all the acid will act in the tooth."

Dr. A. Severance, of Salmon Falls, said that as far as the "New Departure" is concerned, he did not see that there was anything new about the matter. All of us have been in the habit for years of filling teeth with various materials to test them. As many of his patients were rather poor, he had been obliged to fill with something different from gold. Certainly, he had not succeeded so well with many difficult cases with gold as with amalgam. Gutta-percha he had used in its various forms in proximate surfaces, and as long as it remained caries would be entirely arrested. The trouble with gutta-percha had been the wearing away of the material. It would resist what we call decay. There had been one thing that had misled us. We have had the term "decay," or "caries," which was a misnomer. It was not a disease of the teeth: it was the result of chemical or some other action. There was where the word "misnomer" came in, as well as in application to the term "New Departure." His duty had been to save his patients' teeth, and he had succeeded with amalgam in molar and bicuspid teeth to a great extent, where he could not have done it with gold.

Dr. C. G. Davis, of New Bedford, remarked that what Dr. Flagg said in relation to these plastic fillings was that none of them absolutely save teeth, but that they save the greater portion of them; that this had been a matter of investigation with him for a great while; he had kept an exact record and tabulated the results. Was any man's impression as to the results of his practice worth as much as such tabulated results? His own impression about the relative value of gold and amalgam in accessible cavities was in favor of gold. Amalgam fillings did not stand with him as well as gold.

Dr. A. Robertson, of Georgetown, Mass., said that he had formerly been strongly impressed with the idea that amalgam was a bad thing with which to fill teeth. His after-experience, however, satisfied him that teeth could be saved by it that could not be saved with gold.

Dr. T. Fillebrown, of Portland. If we think over the New Departure we shall be surprised to find how few articles there are with which eight out of ten of us would disagree. He thought there were just three: to the others they would all say amen. He thought Dr. Flagg was doing the profession eminent service in bringing these matters more fully before their attention, and that they ought to use plastic materials more than they did. On the other hand, he did not believe that failures in operations were mainly due to the incompatibility of the filling material with tooth-bone, but on account of imperfect manipulation. Some arose from incompatibility, from the electro-chemical reaction between the filling and the tooth-material, but of one hundred gold fillings that fail, with ninety-five of them, had they been perfectly filled, the electro-chemical action never would have taken place.

With other fillings, however, he thought there would be more failures than with gold, as there were more sources of failure with them, and more difficulties to overcome than with gold. In most cases of failure with amalgam fillings, according to his own experience, based upon a record kept for twenty years, he found they were caused by imperfect manipulation. With all this, the best material, however, for a tooth to be filled with was the one the operator felt that he could best fill it with. Each one had a right to judge for himself, and had no right to proscribe another man. All any one could do was to do the best he could in each individual case for his patient, using gold or any other material just as his best judgment directed. In this way all would arrive at the best results.

Dr. L. D. Shepard, of Boston, said he had been disappointed that the discussion had not embraced a broader view of the subject and more of the principles involved, with less of the one question of amalgam. In his essay he attempted to show that the merit of the New Departure consisted almost wholly in the presentation of a scientific principle, and that the modifications of practice recommended were subordinate, and were but a "difference in degree" from ordinary practice. Dr. Flagg has progressed (?) to the degree that he advertises on his appointment cards "No gold used," but he does not understand that Dr. Flagg recommends this course to others. Dr. Flagg informed him that he did this so that there should be some one on the other end of the balance, in extreme opposition to the many who claim that they use "nothing but gold." There are a number of prominent dentists now living in Boston who, in an extended practice, never inserted one amalgam filling. He might name among such Drs. Daniel Harwood, Joshua Tucker, and Elisha Tucker. There is no doubt they have made a mistake in totally ignoring this material, and would have saved more teeth by a judicious use of it. They believed in gold and did not believe in anything else, and were perfectly consistent in living up to their convictions. Dr. Flagg puts himself on the other end of the beam to make it balance. Between these extremes, as this discussion has shown, are the great mass of the profession, some approximating to one end and some to the other.

His position had been near the gold end, so far as amalgam was concerned, but not so far as tin, gutta-percha, and oxychloride of zinc were concerned. The effect of his recent study of this subject is to confirm him in the use of these latter materials, and to stimulate him to a more extended and careful trial of amalgam. He is free to confess that he has used gold in cases where, by the light of to-day, he would have done better service by saving his patients the great expense, the great draft upon their nervous force, and the great loss of time, by using amalgam. When asked the question by a patient, "Can you assure me that anything is as good as gold?" he had been forced to reply that the accumulated testimony of the best men of the profession was that gold was the best material that could be used, and the patient would reply, "I want the best, and am willing to submit to what is necessary to have it." Now, in such frail cases, with a doubtful result, he can say that opinions are changing to a degree, and that he is supported in adopting a modification of practice. Those, surely, who have always used amalgam in such cases, and still more those whose use of it has been to the extent of one-quarter or one-half of all their fillings, can need no such new departure.

The danger is that, as a result of this great hue and cry about amalgam, which is overspreading the country like a flood, men will be carried to the other extreme, instead of being cautious and slightly and gradually changing their practice.

The great question remains, Has it a true theory at the bottom of it? If it has, we have something that is valuable. If it has not, it has no value, though it may be an interesting study for the time being. It is claimed that this theory is supported by facts, but there comes the difficulty. What are facts? One man's facts, deduced from experiment and observation, are antagonistic to another man's. The statement of no one man should be taken as conclusive. Each should investigate for himself.

As a result of his own observations, of his own practice, from his own records, he considers, as facts for his own guidance, that there are no materials which have such a tendency to preserve tooth-bone as gutta-percha and oxychloride of zinc, used in their proper places and under proper conditions and circumstances. The misfortune is that they cannot be universally used, there being certain qualities inherent in the materials themselves which limit their continued integrity. That tin stands next; and that, as regards amalgam, while he would use it in preference to the above "in the proper places and under proper conditions and circumstances," he is, as yet, in doubt in regard to its exact position in the scale of preservative agents.

SOUTH CAROLINA STATE DENTAL ASSOCIATION.

The eighth annual meeting of the South Carolina State Dental Association was held in the city of Columbia on the 4th of June, 1878,—the State Board of Dental Examiners sitting at the same place and time. After an interesting and harmonious session of three days the association adjourned to meet in the city of Charleston on the second Tuesday in July, 1879.

The following officers were elected for the ensuing year:

President.—Dr. J. B. Patrick, Charleston.

First Vice-President.—Dr. I. H. Alexander, Columbia.

Second Vice-President.—Dr. A. P. Johnstone, Anderson.

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Delegates to American Dental Association.—Drs. T. T. Moore, G. F. S. Wright, W. P. O'Neill, A. L. Norwood, G. B. White.

Delegates to Southern Dental Association.—Drs. G. F. S. Wright, H. D. Wilson, B. H. Teague.

State Board of Examiners.—Drs. J. B. Patrick, J. S. Thompson, T. T. Moore, G. F. S. Wright, W. S. Brown.

B. H. Teague, *Corresponding Secretary.*

RHODE ISLAND DENTAL ASSOCIATION.

At the organization of the Rhode Island Dental Association in the city of Providence on the first Tuesday of July, 1878, the following officers were elected for one year:

President.—Dr. A. W. Buckland, of Woonsocket.

Vice-President.—Dr. H. F. Marshall, of Providence.

Secretary.—Dr. L. L. Buckland, of Providence.

Treasurer.—Dr. Wm. P. Church, of Providence.

Dr. Wm. Barker, at whose rooms the association met, read a paper upon the care and treatment of the deciduous teeth. Arrangements were made for the holding of meetings the first Tuesday evening of each month.

L. L. Buckland, *Secretary.*

AMERICAN ACADEMY OF DENTAL SCIENCE.

The time for the annual meeting of the American Academy of Dental Science has been changed from the last Monday in September to the last Wednesday in October, believing this to be a more favorable time for securing a large attendance of members and others.

Geo. T. Moffatt, *Corresponding Secretary.*

HINTS AND QUERIES.

"He that questioneth much shall learn much."—BACON.

CORRESPONDENTS desiring a reply in this department are requested to make use of *distinctive signatures or initials*, and avoid the practice of signing their communications Reader, Subscriber, etc.

CORRESPONDENTS who wish notice to be taken of their communications should authenticate them with their names. We cannot insert queries or replies except they are so accompanied. Names not necessarily for publication.

BY accident I have found that all my hand-pluggers, scalers, and amalgam instruments are magnetized; many of them strong enough to lift a small needle. All of them act strongly on a needle swimming on water. Many excavators are not so, neither are the points of an automatic mallet kept in the same drawer. I have no magnet of any kind in the office. Why is it?—D. H. METZGAR.

WILL somebody inform me of the reason why celluloid plates made on models for dry roofs spring or flatten so that the plates do not touch in the center of very deep roofs?—W. G. J.

ANSWER TO W. J. N.—Certainly, care should be taken to avoid having too much mercury in a plug. I mix by weight. You should bear in mind, however, that every amalgam plug will shrink, more or less, necessarily. I recognize no point between "shrinkage and crumbling" in mixing. Long experience only can teach you how to mix amalgam for every individual case. I do not mix the desired amount to fill a cavity at once, but use it in different states of plasticity throughout the plug, adapting the state of the amalgam to the part of the cavity in which it is used, governed, of course, by experience and knowledge of the subject. There is no wide latitude in the proper use of amalgam. Its mixing and use is an exact science, although many poorly prepared and introduced plugs have had considerable latitude in which THEY have been all right. Again, considerable knowledge is required to know just what kind of amalgam to use in the varying kinds of cavities which present in practice; not using one kind in all cavities, nor throughout the same cavity. As to inserting and condensing amalgam, the best and only correct way is to put it in piece by piece, and tap each piece thoroughly into position. I cannot direct you to any particular work for instructions in the use of amalgam; our text-books, as you say, being silent. —L. ASHLEY FAUGHT.

REFITTING CELLULOID PLATES.—I often refit celluloid plates that have been made soon after the natural teeth have been extracted, and have been worn until the mouth was ready for a permanent plate. My method is to take an impression; make a cast as usual when making a new plate; place the plate therein; heat the part that does not fit the cast until it will yield to pressure, then press it to the model, using a towel or napkin, and holding it in cold water until cold. For heating, I use the self-acting blowpipe; fill the upper part with water; remove the point at the end of the tube, and heat it until the steam will pass out through the tube. It makes a beautiful jet, that can be thrown on any part of the plate. —E. H. LOCKE.

AN interesting case of odontocele has recently been under my care, an account of which may be of interest to some of your readers. February 28th, 1878, a young lady called to consult me in regard to a swelling of the right superior maxilla, by advice of her physician.

It was noticed about twelve years before, when she was thirteen years of age, and had gradually been increasing in size, till, when she came to me, it was the size of an orange, causing the eye to protrude and producing great disfigurement as well as suffering. She had recently recovered from a severe attack of hip-disease, and was in an anæmic condition. At intervals her mind was clouded so that at times she was quite insane.

I at first suspected dropsy of the antrum, and so extracted the first bicuspid, this being the most sensitive tooth under percussion. With a curved instrument I pierced through in the direction of the sinus. An abundant discharge of a dark-brown, inodorous fluid followed its withdrawal. The antrum was syringed out thoroughly each day for two weeks; dilute carbolic acid and iodine being used alternately. I hoped by this treatment to create a healthy action in the mucous membrane and re-open the passage through the middle meatus, which was obliterated.

The discharge having diminished but little at the end of this time, I felt assured I had not discovered the true cause of the difficulty, and in order to get freer access to the antrum extracted the first molar, remarking that the second bicuspid was missing. This the patient assured me was extracted when she was a young girl. I found, on examination, that the floor of the antrum was soft and carious. With cutting forceps I removed the softened portions, making an opening large enough to insert the finger, but no foreign substance or morbid growth was discovered. I then commenced the use of diluted sulphuric acid, applying it on a pellet of cotton directly to the accessible portions of carious bone, and forcing it into every part with the syringe.

At the next visit a further search was made by passing the instrument up between the mucous membrane of the sinus and its outer wall (which was easily done, as a separation had taken place), and a hard, smooth substance was discovered just below the malar process. Believing this to be the cause of the disease, I determined to remove it at that time. As the patient was thought to be unable to endure anæsthesia, I operated without. An incision was made through the soft tissues from near the malar process through the alveolar ridge. I was then able to grasp it with root forceps and remove it. It proved to be the missing bicuspid and the whole outer wall of the antrum, which crumbled away with it, being as brittle as an egg-shell. The root and crown of the tooth were at right angles, which condition rendered it impossible for the tooth to assume its natural position in the arch, hence it became a source of irritation which nearly cost the patient her life. The caries was advancing towards the anterior and posterior portions of the jaw, reaching to the nasal bones and floor of the orbit.

The sulphuric acid was applied daily for three weeks, but little improvement was to be observed, save in the character of the discharge, and in the mental condition of the patient, which was noticeable after the first opening was made. Believing it impossible to save the second molar and wisdom-tooth, I extracted them, and found that the caries had reached the tuberosity. I continued the treatment with acid one month longer, and then pronounced the case cured; the discharge having nearly ceased, and the opening being very much diminished in size, and of such shape that the food could not find its way into the cavity, being like a slit with a lance through the mucous membrane.

The maxillary sinus being a secreting cavity, daily syringing will be necessary for the rest of her life, as the passage to the nares is closed. I instructed her how to do this so she will be able to attend to it herself.—W. E. PINKHAM, D.D.S., *Newark, N. J.*

THE

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ORIGINAL COMMUNICATIONS.

COMBINATION AND THERAPEUTIC ACTION OF SOME FILLING-MATERIALS.

BY D. D. SMITH, M.D., D.D.S.,
PROFESSOR OF MECHANICAL DENTISTRY, PHILADELPHIA DENTAL COLLEGE.

(Read before the American Dental Association, August 9th, 1878.)

Who has not mentally asked the question, as he has taxed himself and his patient to almost complete exhaustion in some dental operation of unusual magnitude or length, Is there not some way either to prevent this destruction of tissue or to restore these organs when attacked, unattended by the severe mental and physical strain upon the operator, and the shrinking, dread, and suffering to the patient which the present general practice and teaching involves?

Is the popular impression true that generation after generation the teeth of civilization are degenerating, and their power of resisting decay lessening? and shall dentistry still persist in averting the evil by the use of one remedy, mechanically applied, in all cases and in all conditions?

Is there no consolation other than this that the profession can offer to the tens of thousands who have never shared its blessings, and to many others suffering abuse from burring-engines, dental mallets, rubber dams, and other appliances, who are in doubt if it confers a blessing or a curse?

Has not the present aspect of dentistry a near parallel in the practice of general medicine of a few years ago, when calomel was of almost universal application? Every age, temperament, and condition felt its power for good or evil. Whatever the trouble, cerebral, thoracic, or abdominal, local or general, calomel as a remedy had its advocates. A generous and earnest spirit in medical science, aiming to relieve suffering and prolong human life, searching for cause and observing effect, broke the bonds of established usage and teaching;

tried other means and remedies, until now, with the truly educated, mercury in any and all its forms is but an adjunct in general practice.

Medicine is not so narrow as to withhold its hands from remedies of merit, because, forsooth, they are not hoary with age and use.

Do not the broken arches and the edentulous mouths, continually presenting, plainly testify that dentistry as now taught and practiced is unable to cope with the diseased conditions of human teeth?

If the profession would avert this evil, observation must be more extended and accurate; new remedies must be sought and applied; investigation by experiment made popular, and the employment of other than mere mechanical remedies encouraged.

The deductions from the teaching of all our text-books, from periodicals and society discussions, point to the use of one filling-material only in a given cavity—and that efficient in proportion as it is mechanically manipulated—for the treatment of all carious conditions and for the restoration of teeth.

If gold is recommended, the inference, if not the positive teaching, is that the filling, to be honestly and efficiently made, must be *all* of gold; if tin is the material, the cavity must be filled entirely with tin; and so also of amalgams, gutta-percha, and oxychloride of zinc. The exception to this is in some more recent and advanced teachings on the use of gutta-percha, tin, lacto-phosphate and the oxychloride cements as coverings for exposed pulps; and different materials for use in roots, whatever may be adopted to complete the filling. It is not too much to say that any consideration or discussion of other filling-materials than gold, of their composition or methods of use, of their behavior in varied conditions of the oral cavity or of their distinctive properties, has been evaded or frowned upon as too elementary and unimportant to engage the attention of writers or speakers. The desire to be known only as a "first-class operator" has held timid ones chained almost exclusively to the mechanical use of one material, and caused the loss to dental science of many an otherwise earnest investigator.

To inquire if some two or more of the present filling-materials cannot be conjointly used in the same cavity for better preservation and greater comfort to the tooth; also to inquire if there may not be some hitherto unsuspected therapeutic action in dental oxychloride of zinc preparations, are the special objects of this paper.

That fillings fail because of lack of adaptation to the walls of cavities is a fact generally believed and admitted, and that gold is the most difficult material to *perfectly* adapt in many cases is also known and admitted. That the oxychloride of zinc cements are among the best, if not *the best*, preservatives in cavities of decay is a truth which will become as fully admitted when it is as well understood. If decay has ever been known to commence anew under an oxychloride of zinc filling when in place, the attention of the writer has never been called to the fact.

Chloride of zinc locally applied is recognized as among the most efficient agents known for promoting healthy granulations, as "in addition to its escharotic properties it appears to exercise a greater influence over the vital action of neighboring parts" than most other caustics; the separation of its eschar leaving healthy and vigorous granulations. It is equally efficient as an antiseptic and a disinfectant. As an application to chronically inflamed and suppurating gums at the festooned margins, after the removal of tartar, it probably has no equal. This liquid meeting so fully the indications for an antiseptic and a stimulant to the production of healthy tissue in a cavity of decay, mixed with the various preparations of oxide of zinc, forms a close and seemingly impervious union with the walls of cavities.

There are good reasons for the belief that these cements when properly manipulated not only exclude moisture, but that they do for diseased dental tissue what chloride of zinc does for more vascular tissue, viz., *stimulate the production of healthy structure* in the parts with which they are brought in immediate contact and in the near surroundings.

Illustration: Ten years ago a cavity of decay was filled on the mesial face of a left superior sixth-year molar with oxychloride of zinc and gold. The decay was deep-seated and involved the whole mesial face of the tooth. A portion of softened dentine was left covering the almost exposed pulp, and the oxychloride placed directly upon it. Enough of this cement was cut away to allow for the introduction of a gold filling, to protect the walls of the cavity and the oxychloride. The tooth was of a character to decay readily and rapidly, but the only object had in view in filling the cavity in the manner described was the better protection of the pulp, by interposing a non-conductor between it and the gold. Something more than six years after, it was deemed advisable to remove this filling for the purpose of gaining access to a small cavity in the distal face of the second bicuspid, which had been forced backward by occlusion until it rested in the concavity of the finished surface of the gold filling. The conditions were such that the removal of this filling permitted access to the cavity in the bicuspid without cutting or wedging, hence the adoption of the plan. Other fillings made entirely of gold and introduced about the same time in other teeth in this mouth had failed, and had been replaced in the mean time.

The dentine under the gold and oxychloride in question had undergone a decided transformation, changing from soft to hard and dense structure, seemingly capable of resisting decay without further protection. This exhibition of the beneficial action (as it seemed) of the oxychloride of zinc made a profound impression. And as its cautious use in all classes of cavities from that time to the present has given correspondingly good results, the most favorable conclusions have been formed for the practice of *lining* all cavities with an oxychloride cement, whatever the external filling is to be.

In many cases time can be saved in filling, the certainty of the operation increased, and the tooth rendered more comfortable to the patient; and further, thousands of pulps which under the all-gold system must be sacrificed or capped but to die under the filling, can by this method be comfortably and permanently saved.

The antiseptic and stimulating action of the chloride of zinc is of a most beneficial character, inducing in many cases better organization of the tissues in the living parts to which it is applied.

The manipulations in their simplest form consist in excavating a given cavity in the usual way and then filling entirely with some one of the best oxychloride of zinc cements,—under the rubber dam if practicable. Having been allowed to set and harden for a few minutes, enough of the cement is cut away or excavated to form a cavity for securely introducing a gold surface filling. By this means the cavity can be nearly filled, or merely lined with the cement, and *it* kept from disintegration by a filling of gold. The color of the tooth is thus preserved, the pulp isolated from thermal shocks, and the preservation of the tooth more certainly secured.

In ordinary crown cavities, and in many cases of deep-seated caries in approximate cavities, this manner of procedure simplifies and shortens the operation of filling, but in small or shallow cavities complicates it. The cavity may be of such a nature as to render the conjunction impracticable. When such cases occur, the cavity can be filled entirely with gold, tin, or any other filling-material in the usual way. In deep-seated crown and other cavities where under-cuts exist, if the enamel is strong it need not be cut away, for when the decay is removed and the cement carefully and securely packed in its place, it forms a support when hard equivalent to true dentine. A cavity cut in it to a depth a little greater than the thickness of the enamel reduces the final filling with gold to an operation of the simplest character, as this new cavity has a hard, firm base of cement, and a boundary of cement and tooth-material, or of the latter alone.

It may well be inquired if there are not some objections to the use of the oxychloride cements in the manner proposed. There is one objection, and it is believed to be the only one worthy of mention. It causes pain in the tooth immediately on application, varying in degree and duration with the extent of the decay and the character of the tooth. The sharpest and most prolonged pain is usually experienced in young or soft teeth, and its duration is from three to fifteen, and rarely to thirty, or even sixty minutes. The pain is greatly lessened or entirely obviated by dextrous and intelligent manipulation, which will follow a study of its peculiarities and its continued use.* Its extensive application for the past two years in all classes of teeth and cavities, as a covering for recently-exposed pulps and in hyperesthetic conditions of the dentine, has failed to develop an uncontrollable or even a markedly obstinate case of odontalgia.

Exposed pulps may be first protected with lacto-phosphate and a Weston cap, with an oxide of zinc *pad*, with gutta-percha, or in any manner which seems most desirable, and the cement placed over the capping used. The oxide of zinc pad is made by mixing the powder of any oxychloride cement with creasote or oil of cloves, using but a very small quantity of either liquid. By patting this mixture with a spatula it can be worked into a mass aptly termed a *pad*. This can be used as a covering applied directly to the pulp, or to prevent pain in deep-seated caries. It is unquestionable that the therapeutic action of the oxychloride is much diminished, if not completely arrested, by a covering of gutta-percha over the pulp, while the oxide of zinc pad modifies but does not prevent its action, and for this reason it is esteemed, and has proved in practice a better and safer capping for pulps than gutta-percha.

That the action of the chloride of zinc is not wholly interrupted by the *pad* is evident in the fact that the powder of which the pad is made becomes in a short time consolidated and almost homogeneous with the oxychloride of zinc used to cover it.

To recapitulate, we find the advantages of the oxychlorides as linings or as basal fillings, to consist in the saving of time; perfect apposition of filling-material with the walls of cavities; solid base and actual support to frail walls; secure anchorage for metallic fillings; ready adaptation in places difficult or impossible of access with gold; no discoloration of the material itself, and a preventive of discoloration in dentine; comfort, especially to highly-organized teeth; a stimulant to the production of heathy tissue, and the most effectual preservative known in dentistry.

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* It has been urged that the chemical combination which is the result of bringing together oxide and chloride of zinc destroys the therapeutic effect of the latter, but the fallacy of such reasoning is shown by the facts here stated; and further, an application of oxychloride of zinc carelessly or injudiciously made produces pain undistinguishable in character from that of an application of chloride of zinc in the same place.

DENTAL PATHOLOGY AND THERAPEUTICS.

BY J. FOSTER FLAGG, D.D.S.,
FORMERLY PROFESSOR OF DENTAL PATHOLOGY AND THERAPEUTICS IN PHILADELPHIA DENTAL COLLEGE

[Entered according to Act of Congress, in the year 1873, by J. Foster Flagg, D.D.S., in the office of the Librarian of Congress at Washington.]

(Continued from page 414.)

XI. *Excision of pulp without alleviating hemorrhage, if required.*—In almost every case which may accurately be called *excision of the pulp* there is more or less hemorrhage,—as this is absent only in connection with the extirpation of such pulps as have been devitalized for a sufficient length of time to permit of *sloughing*,—and thus, by *nature's* solution of continuity, precluding the possibility of such occurrence, it is desirable that in all other instances it should be remembered as *probable* that care will have to be exercised in guarding against this cause of irritation.

Hemorrhage from excision of the pulp will be found to occur in all degrees, from instantaneous and excessive to very tardy and exceedingly limited in amount.

Just in proportion as it is instantaneous and excessive (within the bounds of *hæmorrhagia*), so is it *not* likely to give trouble; for the evident flow of blood would naturally suggest the need for careful and systematic suppression, and any uneasiness resulting from too promptly arresting the bleeding would as naturally be relieved by removing the canal dressings.

On the other hand, just in proportion as the hemorrhage is tardy and limited in amount, so is it liable, eventually, to cause peridental irritation, somewhat difficult of etiological solution, and, consequently, less easy of therapeutic control.

In every case of bleeding from pulp-excision, it is safer to err upon the side of caution before finally introducing the permanent canal stoppings; and here, again, we find the temperamental attributes one of the safest guides in treatment. These are, however, to be viewed as modified by systemic condition. Thus patients of bilious or sanguine temperaments, even though modified by the nervous, are usually anti-hemorrhagic and recuperative, if in ordinarily good systemic condition, and respond reasonably well to treatment, even if atonic from other existing disease or from debilitating influences.

Patients of lymphatic temperament, on the contrary, are prone to hemorrhage of tardy pronouncement and gradual (though none the less sure) aggregation.

These are difficult to treat, even when in good systemic condition, and the complications increase apace with every increasing deviation from their normal standard of health.

In *all* cases it should be remembered that after the flow of *red* blood has ceased there still remains the flow of *white* blood (lymph) to contend with, and that this white blood, so essential, even here, to the final healing, becomes, from anatomical considerations, an irritant. This is due to the unyielding character of the parts into which the flow is directed.

The roots of the teeth, the pulps of which have been excised, fitting accurately their alveoli, preclude the possibility of the presence of more than a very slightly increased amount of fluid about their apices. So long as these apical foramina afford a sufficient means of exit for this flow the chances for a gradual restoration to comparative normality are favorable; but the want of recognition of this flow of lymph, permitting the too hasty closing of these needed vents by the introduction of canal dressings, *and sometimes even of canal fillings*, is a very frequent source of subsequent pain to patients and vexation and annoyance to practitioners.

Experience alone can educate as to the most rapid conduct of such cases consistent with safety; but, as I have said, it is safest to err on the side of caution,—advice which *I follow* as well as give, even with all my experience in this direction, and perhaps I might better say, *as a result of the teaching* of this experience.

If the least doubt exists as to the continuance of hemorrhage—*never so slight*—it is better to stop accurately the cavity of decay *only*. placing in the pulp-cavity a loose pellet of cotton,—*preferably absorbent cotton*,—and leave the canals empty.

This will permit of a certain amount of flow from around the apices of roots *into* the canals and into the meshes of the cotton. thus preventing the irritation which would surely follow the too hasty stopping of the canals, and at the same time giving positive proof of the flow, or cessation of flow, in the presence of a moist or dry pellet of cotton, or of moisture or dryness in the canals.

In proportion as patients are lymphatic in temperament or asthenic in systemic condition, so must *length of time* be given for the determining of absolute cessation of flow of blood or lymph; and in cases of obstinate or long-continued hemorrhage, the utmost caution must be exercised after its stoppage that it be not again invoked during the subsequent operations of filling the canals, pulp-cavity, and cavity of decay or tap.

XII. *External irritation by forcible withdrawal of pulp.*—It is sometimes the case that a clean excision of the pulp is not made in the process of extirpation, but that the twisting of the broach in the tissue of the pulp, and the subsequent forcible withdrawal of this organ, results in a degree of tension which, prior to laceration, draws through a large apical foramen considerable arterial, venous, nervous, and connective tissue which properly belonged outside the root of the tooth. Laceration having been finally accomplished, it sometimes follows that a seriously painful result is induced.

Not only do we have that *retraction*, due to the elasticity of the tissue, which causes a wide *separation* between the torn mouths of vessels and the apical foramen, and, almost certainly, permits a clotting of blood about the end of the root, thus obstructing what would otherwise have been a free passage for the relief of the parts, but we also have a rudely-wounded nerve filament pressed upon by the aggregating blood, and, in its response to irritation, sadly complicating an unfortunate condition of affairs.

Soothing local medication, as tincture of aconite, in the canals and upon the gums, together with such guarding as will preclude the possibility of irritation by occlusion during mastication, and the giving of sufficient *time* for recuperation, will generally result in final relief; but in some extreme cases, serious facial neuralgia of long standing, and obstinately intractable, has only been finally relieved by extraction of the tooth and very potent medication of the parts through the alveolus.

I have treated two cases of this kind, in connection with front teeth (both superior), by drilling above the apices of the roots and medicating through the openings; but I cannot, as the result of these experiences, recommend such treatment in cases of bicuspids and molars, unless it might pertain to such as were of *exceeding* value.

XIII. *Putrescing pulps.*—We have now reached that which is, by far, the most frequent cause of periodontitis, and to which I shall endeavor to direct attention with that minuteness of detail which its importance unquestionably demands.

If, as the result of an unnecessary amount of excavating in a cavity of deep-seated decay, a metal filling of high thermal conductivity has been introduced into too close proximity with a pulp; or, if an exposed pulp has been improperly covered with a filling, either through ignorance or inadvertency; or, if an attempt to preserve the vitality of a pulp, at the hands of a skillful practitioner, is proving unsuccessful, it is generally, *though not universally*, announced by irritation of the pulp.

The symptoms of this condition are pain in or about the tooth, or (frequently) sympathetic or reflex pain either in cheek, ear, eye, opposite jaw, or even in distant parts, as neck, arms, hands, etc.

The pain varies notably in intensity, frequency, length of duration, and in all other of its various characteristics, as throbbing, lancinating, shooting or darting, etc.

It is, however, *generally* referable to the irritated pulp which is the *cause of trouble*, and which should be always *suspected* in such cases.

A *determination of blood* with its concomitant throbbing is liable soon to result; this is followed by the *congestion* of the pulp, with its concomitant dull, constant uneasiness; this in turn is followed by a gradual cessation of sensation should the pulp die of congestion, or an aggravation of sensation should *inflammation* of the pulp take place.

In this event a greater or less number of paroxysms of toothache usually occur, varying in intensity, but still not compelling the patient to seek dental assistance.

These, in time, as portion after portion of the pulp becomes devitalized, eventuate in death of the terminal filaments of pulp-tissue, giving rise to that *external irritation* several times referred to as one of the results of the effort at separation or *sloughing* of the parts at the apex of the root.

This produces more or less tenderness of the tooth upon pressure or from occlusion, which is of longer or shorter duration according to the susceptibility of the patient, but usually passes away promptly.

We have now a tooth containing a dead pulp. *Then comes a quiet time.* This is technically termed "a treacherous quiet."

In due time, usually from one or two weeks to one, two, or three months, the crown of the tooth (if it be incisor, cuspid, or bicuspid) becomes "clouded," producing a slight change of color and an opacity, which tells its tale to the eye of the expert.

This opacity is more markedly observable if reflected light is directed upon the palatal or lingual face of the tooth by means of a mouth-mirror.

In molars this change does not take place nearly so promptly nor so decidedly as in the smaller teeth, a fact due to the greater thickness of dentinal tissue covering the pulp; but, in time, marked change of color usually occurs in these teeth also.

As month after month passes by, the dead pulp either dries (rarely) and remains innocuous for many years, perhaps for all one's lifetime, or it slowly putresces (the usual result), and in its putrescence evolves mephitic gas, discoloring and softening almost to fluidity; oftentimes it permeates the dentine, increasing markedly the darkening of the tooth.

To the ordinary degree of infiltration of decomposed pulp into dentine, which would result from contact, is added the force of the evolving mephitic gas, which, confined in the pulp-cavity, the apical foramen yet being practically closed by undecomposed tissue, drives the discoloring material thoroughly through the dentine even to the enamel, sometimes darkening, notably, even this tissue.

It should be noted here, that this discoloration is always *bluish* or *grayish* in its clouding, a tinting which is *diagnostic* of *devitalized pulp*, in contradistinction to the yellowish or bronze-like coloring which is given by dental necrosis.

The "treacherous quiet" which exists during this painless discoloration is of quite varied length of duration. The shortest period which I have ever experienced in practice was in the case of a young patient of pure nervo-lymphatic temperament and of enfeebled systemic condition. A large cavity of decay had so nearly exposed the pulp in a superior central incisor, and had occasioned so many and such severe paroxysms of toothache, that it was deemed advisable to devitalize the pulp. This was done with the usual arsenical application, with the direction to return in two weeks unless relief from pain was sooner desired. In *five* weeks after the young gentleman called with *periodontitis* from *putrescent pulp.* He gave the usual story of feeble spasmodic devitalization, with "a day of soreness of the tooth about a week or so after the medicine was put in," and then, *having no more pain*, no thought was given to the second appointment. The application was removed, the pulp-cavity opened, and with the escaping odor of putrescence relief was given in the course of ten or fifteen minutes. The pulp was extirpated, the canal dressed for a week, the tooth filled, and now (twelve years after) is doing comfortable service.

I gave to this case *three* to *four weeks* as the time *proved* sufficient to induce *periodontitis* from *putrescent pulp* after devitalization.

So far from this being *usually* the case, it is *seldom* in less than *six months after devitalization* that peridental irritation arises from pulp-putrescence.

More frequently it is *a year*, and my experience is, that from *eighteen months* to *three years* usually pass, the length of time being governed by the degree of temperamental and systemic resistive power, the maturity of the tooth, and the density of its structure, before this result ensues.

I do not think that *complete* devitalization has taken place, even as a usual thing, so long before *complete* putrescence, but wish to be understood as giving these various *lengths of time* as the intervals which respectively occur between the *suffering concomitant with pulp-devitalization*, from whatever cause, and the *recurrence of painful symptoms from peridental irritation due to pulp-putrescence.*

Again, even much longer *periods of quiet* will occasionally present as anomalies, and these may vary until we find *five*, *seven*, and even *nine* years intervening, during which time certain teeth, after having given the paroxysmal pains of dying pulps, remain in a perfectly comfortable transitional state, until eventually a thoroughly putrescent pulp gives rise to periodontitis.

(To be continued.)

EFFECTS OF SULPHURIC ACID UPON LIVING BONE.—VIVISECTION EXPERIMENTS.

BY J. N. FARRAR, M.D., D.D.S., BROOKLYN, N. Y.

No. IV.

HAVING given in the July, August, and September numbers of the DENTAL COSMOS, under the head of "Creasote *versus* Acid Treatment of Alveolar Abscess and Necrosis," the results of a portion of my experiments upon three varieties of lifeless bone, I will now proceed to give the results of some experiments upon living bone.

Negative results proven by experiment may be as valuable as positive. We do not want speculation as to whether sulphuric acid will dissolve living bone or not, but facts.

Bone may be called living bone when it belongs to and is a part of a living organism. In no sense can a bone which has been separated entirely from a living animal for a few hours be called living bone. The femur in the living ox is a living bone; but, when that femur is removed by amputation, or after the death of the animal, it is dead.

There are, however, different degrees of life in living bone; and on this account it may be divided into classes the same as dead bone. If an animal be in perfect health, it may be said to have the maximum degree of life; but if the animal have a wasting disease, the tone of the system will be lowered, and, although the bone might be said to be living, it would in reality be in a pathological condition and tending toward death. Much of interest might be said upon this sliding scale of health, but this must suffice for the present.

Bone is nourished both from the periosteum and from the medullary substance; if, therefore, it be at some point divested of its periosteum, its nourishment will be reduced and confined to that derived from the medullary substance. Such bone may, however, remain alive so that it will reunite with its periosteum, if it be not separated from it too long; as, for instance, in case of the whitlow being opened early and the pus-débris being allowed to escape.

Again, if the periosteum be separated from the surface of the bone too long, the exterior portion may die, even while the internal portion may yet be living. This appears to prove that, although the internal nourishment may suffice for a time to sustain the internal part of the bone, it is not sufficient to maintain life in the outer portion for many days.

If we amputate a tibia midway its length, and the flesh be properly closed over the stub, the bone will continue to live as well as before; but, if denuded of the soft tissues so that the bone protrudes, though the periosteum still covers it, it is deprived, in a measure, of its normal life-sustaining influences, and, being exposed, will soon fall in degree of health though it will continue as living bone for several days. But if the periosteum be at the same time forced up and the stub of the bone be exposed, it is deprived of all nourishment except from within.

This offers an easy, but less valuable opportunity for experimenting upon living bone, since the life of the stub cannot be fully maintained. But if the periosteum upon a limited area of an entire bone be divided longitudinally with the bone so that the circulation is not materially disturbed,—as in the case of a whitlow in the finger,—and then, by some delicate mechanical means, the soft tissues and periosteum be carefully divided, exposing only a very small portion of the bone, the life of the bone will be better preserved.

The experiments herewith recorded were made in conformity with the foregoing deductions. I was assisted in them by J. G. Wood, M.D. (surgeon), C. S. Abrams (a student in medicine), and two other gentlemen. I was thus enabled not only to perform them successfully, but without pain to the subject. The following is a brief of the minutes recorded by Mr. Abrams and myself during the experiments, performed upon a lamb four months old, of full growth, strong, healthy, active, and having a heavy fleece.

The operations were commenced on Thursday, at two P.M., by placing the lamb upon its side, and rendering it insensible by chloroform. It was then secured firmly to the table by ropes and straps, to prevent its movements interfering with the operations.

The forelegs having been chosen for the operations, the skin and soft tissues—very thin—on the front portion of the right tibia were cut longitudinally for about one and a half inches, so that the tibia (or rather the union of the tibia and fibula) was exposed to view, by separating the soft tissues with tenacula. No arteries were cut, and there was only about a drachm of blood lost. The bone, which is half-round, was then cut transversely with a saw about midway of its length, about four-fifths of its diameter. To avoid rupturing the tibial artery (lying in a groove in the posterior surface of the bone), the remainder was broken; but though great care was exercised, the artery was ruptured. It was soon ligated, however, with the loss of about half an ounce of blood.

The leg was then bent back upon itself, and secured to the shoulder by a cord. The free extremity of the bone belonging to the portion of the leg next to the body was now exposed by pushing the soft tissues with the periosteum back about one inch without materially disturbing the circulation of the blood in the vessels.

A piece of rubber dam with a small hole punched through it was then forced over the stub and bound firmly by a string, a small roll of rubber having been first placed over the groove in the flat surface of the bone in order to make the dam fit tightly and prevent leakage. The bone was then inserted into a small glass bottle, containing one-third of an ounce of aqueous solution of pure Nordhausen sulphuric acid (one to four). The rubber dam was then brought over and tied tightly around the nose of the bottle. The operation was completed in forty-five minutes. The oozing of blood from the medullary portion of the bone caused a discoloration of the solution at first, but after about half a dozen drops entered the acid its astringency prevented further flow. The leg was then confined to a block of wood, so that it was on a level with the shoulder, and the acid solution held constantly in contact with the bone.

Although this bone, in the earlier part of the experiment, was living bone, yet, as it had been divided and deprived of its periosteum, it would after a few hours naturally lose more or less of its vitality; but it was by no means dead bone.

In order to ascertain the action of acid on a more vigorous condition of bone, I conceived the idea of operating through a longitudinal fissure in the tissues at a corresponding point of the left foreleg.

To accomplish this a tin tube was previously made, one and three-quarters inches in diameter, and three and a half inches in length, sufficiently large to allow the leg to be passed through and be set in plaster. In the middle of this tube an oval hole, five-eighths of an inch by one and a half inches, was made. Over this aperture and at right angles with it was soldered a tin semi-tubular frame, about four inches in length by one inch in diameter, with a nut fixed in the outer or free extremity. A small homœopathic bottle, the mouth of which was three-eighths of an inch in diameter, having a rubber packing to prevent leakage, was inserted in the frame, and held in position by a thumb-screw, causing it to tightly fit upon the bone, rubber packing being interposed between the bottle and the screw. This bottle contained pure ordinary sulphuric acid one part, and water four parts. At three P.M. this operation was commenced. For greater convenience the tin tube was opened along its posterior side, and placed around the foreleg, so that the oval hole was over the tibia. Salted plaster of Paris was then inserted, and the tube closed and bound loosely about the leg. A longitudinal slit was now made in the bone, and the tissues separated so as to admit the open end of the bottle, which was held in position by the thumb-screw in the skeleton tube.

During the next twenty-six hours the lamb was examined at frequent intervals. Occasionally, to prevent pain or muscular twitchings, a hypodermic injection of morphia was administered. The creature did not seem to suffer at all, and when not fully under the influence of the morphia would eat and drink naturally, and was always ready for a meal of fresh grass, which was freely given to it.

On the following morning the bottle on the right leg was found to have leaked so much that it was thought best to remove it, which was accordingly done, and a new bottle put in its place containing a solution of pure ordinary sulphuric acid, one to four. The first bottle contained Nordhausen acid, and had been kept in position nineteen hours. The leakage had acted upon the soft tissues, but had not penetrated beyond the thickness of card-board. The solution, when removed, was found to be turbid with blood and a precipitate of bone. The bone was soft, white, and chalky, showing decided chemical action upon it. The bottle in this second attempt was made to fit without leakage. In an hour and a half the fresh solution was milky from solution of the bone.

At six o'clock the lamb was killed, having been under experiment twenty-seven hours. The solution belonging to the second experiment, on the left leg, was, unfortunately, lost in its removal. This solution was milky in appearance.

On examination, the stub-bone showed that a decided chemical action had taken place upon it, and the bottle contained a large quantity of precipitate.

A circular area of bone on the left leg, about three-eighths of an inch in diameter, had been acted upon, but, owing doubtless to the bone having retained a greater degree of vitality, and also to the fact that the solution used was not as strong as the Nordhausen, there was not as much disintegration of bone as in the other experiment, although evincing unmistakable evidence of chemical action. Little white blisters were apparent upon the surface of the bone, which broke on pressure, leaving pits about one-sixteenth of an inch in diameter, and about one-thirty-second of an inch in depth.

Both bones, after removal, showed that an inflammatory process had commenced in them.

These experiments show that living bone is acted upon almost as vigorously as dead bone.

PROCEEDINGS OF DENTAL SOCIETIES.

AMERICAN DENTAL ASSOCIATION.—EIGHTEENTH ANNUAL MEETING.

FIRST DAY—*Morning Session.*

THE eighteenth annual session of the American Dental Association was held in Grant's Hall, Niagara Falls, on Tuesday, August 6th, 1878. At ten o'clock A.M. the president, Dr. F. H. Rehwinkel, of Chillicothe, Ohio, called the meeting to order, and prayer was offered by Dr. Morgan, of Nashivlle.

The usual formalities of calling the roll and reading the minutes were proceeded with, and the printed programme offered by the executive committee was adopted.

The resignation of Dr. Birge, of California (owing to his distance from the Eastern States), was received and accepted.

The corresponding secretary reported that, in pursuance of a resolution, he had procured the engraving of a certificate of membership at an expense of eighty dollars, and an additional cost of eleven dollars for printed copies. The report was laid on the table without acceptance, to permit the certificates to be examined.

The amendment to the constitution offered last year, by Dr. Taft, which proposed to limit representation in the association to *State* dental societies (instead of *all* local societies, as now) and dental colleges, was taken up, and, on motion of Dr. Buckingham, was indefinitely postponed.

A proposed amendment, which made the ratio of representation one delegate to fifteen members of local societies (instead of one to five as at present), was voted down.

Reports of special committees were called for, and Dr. Hunt, of Washington, read the report of the majority of the committee of ten, appointed last year on the subject of dividing the association into permanent sections. [This committee had been first appointed in 1876, and last year had reported in favor of the proposed plan, but on the acceptance of their report, the original committee (of three) had been enlarged to ten members, and the report of last year was recommitted to them with instructions to print and mail to each member, previous to this meeting, the result of their deliberations.]

The report considered that the principle of division of labor and concentration of effort applied with peculiar force to our investigations and researches, and that it was probable that more could be accomplished "by persistently pursuing scientific inquiries in a single direction, than by the present system of preparing papers or essays year after year, and each year on different subjects."

The members of annual committees are appointed in many instances without having been previously consulted, and thus placed in charge of subjects not consonant with their tastes. The papers contain much of repetition, and lose much force by being merely an expression of individual views. Under the proposed plan, each member would be free to select for himself that channel of study and labor which his acquirements, knowledge, and tastes led him to prefer. Each section, being continuous from year to year, can present well-digested labors, which will give its dictum a type of authority, such as is now accorded to well-known investigators in various scientific branches. Each section would receive in turn the benefit of the efforts of all, and thus the results would be more beneficial to the association and the profession at large.

The objections to the plan were then mentioned; the first being the introduction of new and untried machinery; the second, the doubt whether the members, having united with a section, would work so as to make its labors effective. These objections, however, pertain more to the disposition of the membership than to the system itself.

If the system should be adopted, the first step would be the formation and organization of the sections by the election of chairmen, etc., and each might divide its subject into as many heads as desirable. The several chairmen might constitute a committee to mature a working plan. Each section would discuss its own report while making it up, and the reports would all be discussed by the association.

The majority of the committee then offered a series of resolutions, which provided as follows: 1st, that the association is hereby divided into twelve permanent sections, each to be composed of such members as may elect to form such section; 2d, each member to join some section, but to follow his preferences, and to be at liberty to be a member of two or more sections; 3d, each section to elect chairman, etc., immediately after the regular election of officers in the association; 4th, sections to be named as follows:

1. Operative Dentistry and Dental Surgery;
2. Artificial Dentistry;
3. Anatomy and Physiology;
4. Histology and Microscopy;
5. Etiology;
6. Pathology and Therapeutics;
7. Chemistry and Materia Medica;
8. Metallurgy and Chemistry of the Metals;
9. Dental Education;
10. Dental Literature;

11. Dental Nomenclature;
12. Dental Appliances;

5th, each section to communicate to any other the latest and best information on its subject, on proper application.

This report was signed by Drs. Hunt (Chairman), Atkinson, Morgan, Spalding, Judd, H. A. Smith, and McQuillen, all of the committee except two,—Drs. Shepard and Crouse.

On motion of Dr. Shepard, the report was laid on the table until the minority report should be presented.

At a subsequent meeting the minority report was presented, and accepted without reading, and further time for consideration given. The minority stated that "they were and are in doubt as to the wisdom of dividing the association into sections, but as the opinion in favor seemed to predominate, they would recommend that the experiment be tried. They recommended that at first the sections should be few, and then subdivided as might seem desirable. As a *resolution* is of no effect in opposition to the constitution, they presented without further argument, the following draft of amendments to the constitution."

The proposed amendments consisted mainly in the substitution for Article VI. of the constitution (which provides for the appointment of standing committees) an entire new article, as follows:

SECTION 1.—To prepare, arrange, and expedite business this association shall be divided into six sections, as follows:

1. Artificial Dentistry, Metallurgy, and Chemistry.
2. Dental Education.
3. Dental Literature and Nomenclature.
4. Operative Dentistry.
5. Anatomy, Physiology, Histology, Microscopy, and Etiology.
6. Pathology, Therapeutics, and Materia Medica.

SEC. 2.—It shall be the duty of each permanent member to inform the recording secretary, before the close of the morning session of the third day of the annual meeting, which of the six sections he elects to join for the ensuing year. He shall be free to follow his own preferences as to the particular channel in which he will labor, but can be a member of but one section during the same year.

SEC. 3.—It shall be the duty of the recording secretary, immediately after the close of the above morning session of the third day, to make out lists of the names thus furnished, of each section, as a basis for the election of officers of said sections.

SEC. 4.—The association shall, by vote, assign some time after the regular election of officers of the association for the meeting of the several sections for organization.

SEC. 5.—When the time for the organization of the sections has arrived, it shall be the duty of the recording secretary to furnish some one member of each section with the list of members of his respective section, which member shall thereupon call the members to order, and read the list of names. The members shall then elect by ballot a chairman and such other officers as they may see fit.

Sec. 6.—The chairman shall preside at all the meetings of his section; shall exercise general supervision over the business, and shall see that the labors of his section are conducted in the manner calculated to secure the best results. The chairman, or such other member or members as the section shall select, shall prepare and read at the annual meeting of the association next ensuing a paper or papers on the advances and discoveries of the past year in the branches included in the section. The reading of such papers shall not together occupy more than forty minutes.

Sec. 7.—The several sections shall meet at ten A.M. on the morning of the first day of the annual meeting of the association.

Sec. 8.—For the information of all members a list of the members of each section shall be published in the Transactions of each year.

(Signed) L. D. Shepard.
J. N. Crouse.

Later in the session action was taken upon both reports, which for convenience of reference we record in this place. Neither of the reports were read, but both having been presented, were before the members. A motion was made to adopt the minority report, and on the question being put, the same was adopted without a dissenting voice. This, indeed, would have been fatal to the success of the measure in any form at this session, since an amendment to the constitution could be adopted at the same session when proposed only by a unanimous vote.

Near the close of the last session, on Friday afternoon, the sections were organized. Up to that time forty-six permanent members had handed in their names to the secretary as provided for in the new article adopted, who made choice as shown below. A recess was taken for the purpose of allowing the sections to meet and organize, and they were accordingly called to order in different parts of the room, and effected their organization as follows:

Section 1.—Artificial Dentistry, etc. (four names handed in), R. Finley Hunt, Chairman; C. S. Stockton, Secretary.

Sec. 2.—Dental Education (ten names), J. N. Crouse, Chairman.

Sec. 3.—Dental Literature (three names), W. H. Atkinson, Chairman; J. Taft, Secretary.

Sec. 4.—Operative Dentistry (twelve names), I. J. Wetherbee, Chairman; W. H. Goddard, Secretary.

Sec. 5.—Anatomy, Physiology, Histology, and Microscopy (eleven names), M. S. Dean, Chairman; M. H. Webb, Secretary. This section was subdivided into three subsections, viz.: (1) Anatomy and Physiology; (2) Histology and Microscopy; and (3) Etiology.

Sec. 6.—Pathology and Therapeutics (six names), F. H. Rehwinkel, Chairman; Will Taft, Secretary.

Although but a portion of those who had signified their choice were present at the organization of the sections, yet sufficient were on hand to effect the organization, and the new plan is thus in full working order, with fair prospects of success.

Dr. Atkinson, from the special committee appointed last year on Nomenclature and Terminology, read a report.

Dr. John Allen said that an improved nomenclature was much needed. For example, the term "mechanical dentistry" did not signify what is embodied in the expression. Much more is signified; the work should be artistic, and he much preferred the term *artistic* dentistry. The mechanic works by rule and scribe; one thousand articles are made alike, but this is not the case in dentistry. There are no two cases alike. The mind should be drawn upon; and there should be a knowledge of the origin and insertion of the facial muscles. He was glad the subject has come up.

Dr. Atkinson said that we must take a departure up or down; there is no other way but to demolish what we have had, as we demolish the food we eat, to the potentiality of chaotic mass. We do not know when we are nominating truths.

Dr. McQuillen called up the following amendment to the constitution, proposed by Dr. Hawxhurst, lying over from last year:

> "No dental college shall be eligible to representation in this association which does not require two courses of lectures as a condition of graduation."

Dr. Fillebrown moved its adoption.

Dr. Hunt asked where we obtained the authority to require this. Colleges needed fostering instead of discouragement. He denies the right to say anything to them authoritatively, but if anything was to be said, it should be, "Put your standard up, and make all your graduates measure up to it; make the diploma mean its face, and not a two years' course." He was opposed to the amendment. It was calculated to sow seeds of discord in the association.

Dr. Rawls asked if it was intended to exclude one-course medical students from entering a dental college as entitled to graduate on an additional course. If so, the action would deprive us of some of our best men, and is out of order.

Dr. McQuillen said it was not so intended by the mover of the amendment, whose object seems to be very much misunderstood by the members.

Dr. H. A. Smith inquired if the author of the amendment had not himself graduated with one dental and one medical course.

Dr. Shepard explained that only dental colleges are intended.

Dr. Buckingham. All dental colleges take a medical course as an equivalent for one term.

Dr. Morgan said it would involve ignoring the diplomas of those who graduate at such colleges.

Dr. Atkinson. This body has nothing to do with the qualifications of the individual, even though it were a horse-thief who presents regular credentials. This body must not transcend the rights of its constituency. He hoped the resolution would not pass.

Dr. Wetherbee was disinclined to stultify himself, and did not want the body to do so. We have never taken high ground with reference to qualifications. Noble and proficient men who are with us to-day have graduated in one course. Shall we dictate to the colleges? We have no right to do so,—and can only recommend. The resolution is unaccountable.

Dr. McQuillen did not think an open discussion of this subject would sow the seeds of dissension. If improper, the resolution should not be tabled with the view of preventing an expression of opinion, but voted down *after* it has been *proved* to be so in fair debate. This is a representative body, and the delegates are sent here to make laws to govern the association; and that portion of the profession which look to it as of authority do so on the principle of the consent of the governed. Do the colleges that require two years of study, and attendance upon two winter courses of lectures, one of which may have been in a medical college, demand too much? There is not a mechanical occupation in the land that does not require more time of its apprentices. Is dentistry so much easier to learn than a trade that time is not to enter as *one* of the important elements in the preparation of a student for practice? Thoroughness in training cannot be secured without an adequate period of discipline, devoted to study and practice. If this association, which may be properly regarded as representing the wisdom, the aspirations, and desires of the profession in America, should decide that such a requirement ought not to be demanded of the dental colleges, it would relieve the institution with which he had the honor to be connected from requiring of all students attendance upon two full courses of lectures, for that rule was adopted by them under the conviction that it was the expressed wish of the leading members of this association that the dental colleges should adopt that course. The sentiments expressed heretofore have been emphatically in that direction.

Dr. Spalding. The resolution is too indefinite. It is an attempt on the part of this body to regulate the details of the working of colleges. That is not the object of this body. The advancement of the profession is our object, and that of the colleges is to give students an evidence of their attainments,—that is, a diploma. Suppose a person applies who is as well qualified as the professors; must he be required to begin where a tyro begins, and go through the same courses, much of the teaching being familiar to him? Is it just and right to drive such men away from associated bodies? Dental education is at a discount, and colleges have been criticised both with justice and injustice. If the critics will show the way to do better we will stand off; but when they do nothing but criticise, and do not recognize what is done, it is wrong and should be cured. This association should establish a standard up to which every applicant for a degree should come, be he practitioner or student; but it should not require educated men to go through the same course as the student who has not read a book. This is contrary to the practice of the leading educational institutions of the world. When a student presents himself to these institutions, he can graduate in one year or less if he can pass the examinations. He is even given a chance to make up in the interim any deficiency, provided only he can come up to the standard at the end. There should be but one standard for all colleges.

Dr. Flagg said he was on the side of the last speaker; he had always opposed the *time* feature of graduation. The faculty should be a judge of qualifications, and a man should have a diploma at the last moment, if qualified, and if the faculty won't give it to him, it is his duty to sue them. The association should taboo diploma-shops, but should not dictate as to time. If a man passes, he should have a diploma.

Dr. Peirce. There are really no qualifications prescribed except money; students are required to take tickets for one or two courses of lectures, but they cannot be compelled to attend; they may absent themselves in toto. The public does not care where a man gets his information. The University of Pennsylvania does not require attendance, but the examinations must be passed before a degree is granted. It is arbitrary to prescribe two courses. Examining boards should be outside of colleges. If we can make a standard let us do so; but he was opposed to the resolution.

Dr. Buckingham asked Dr. McQuillen if the Jefferson Medical College did not graduate students in one term who had been five years in practice; that is an institution of high standing.

Dr. McQuillen understood that reputable practitioners had been accepted in that way by the Jefferson in former years. Whether it does so now or not he was unable to say; but it never offered this as an inducement, or advertised the fact.

Dr. Hunt. Do any dental colleges advertise such an inducement?

Dr. McQuillen. The statement in the college announcements that "five years' practice in dentistry inclusive of pupilage will be regarded as equivalent to one course of lectures," can be defended on no other ground than expediency, and it is a standing advertisement encouraging, and indeed offering a premium to, young men to enter the offices of practitioners, who are willing to take them with the understanding that after remaining a few months, and perhaps but a few weeks, they can engage in practice with such inadequate preparation; and after doing all the injury they can to the profession and community, subsequently taking advantage of the "five years'" clause, graduate in one term. If this association cannot take a stand against this, how can two out of ten dental colleges do so?

Dr. Hunt. Every change should be made on principle; on what principle is this proposal based? If it is that two years' time should be the standard, that is false and not a principle. Cannot gentlemen who have practiced for years come up to the standard in less than two years? This association is traveling out of its sphere when it prescribes this regulation. If it has this right, it has a right to require four years. This is introducing a controversy for no good. These details should be left where they belong. Colleges should be required not to send out men unless they are qualified.

Dr. Morgan. This resolution does not convey the idea of anybody. Gentlemen get into inconsistency on this subject; they say we have no right to legislate, and before they sit down they say we should fix a standard! It had been stated that it was the business of the faculties to grant diplomas; he had supposed that it was the business of the faculties to *teach*. It may be arbitrary, but all laws are arbitrary in a sense. Each member of society surrenders something of private right for the general good. We have a right to prescribe regulations for membership with this association, and the basis on which delegates should be received; it is our duty to control indirectly the teachings of schools. It is time to begin to legislate. He would like to see the resolution so amended as to make it definite, and then passed.

Dr. Frank Abbott. In regard to these "honorable men" who have been mentioned, who have been in practice; for ten years his college had admitted practitioners, but they could not do anything but fill teeth and make plates. Two years is short time enough, and the colleges should be required to prescribe a longer time. Time is essential. It makes all the difference in the world, the time spent on our books. The society should stick a peg somewhere; a standard should be fixed.

Dr. McDonald. It is said we have no right to govern colleges; the resolution does not mean this, but only prescribes requirements to them as to other bodies. If we have no right to do this, we had no right to lay down the Code of Ethics, and require its adoption by the State and local societies, as was done years ago. We *have* the right; it is only a question of expediency.

The Chair. We have the right to and do prescribe qualifications of members. Read the printed testimonial prescribed by this association, which every delegate must present before he can take his seat.

Dr. Rawls. The resolution is indefinite. There is no objection to raising the standard, but the statement should be definite. The resolution pays no attention to medical graduates. We are stultifying ourselves in this.

Dr. Cushing thought the resolution did not cover the ground intended, and moved its reference to a committee of three, which was carried, and the committee was announced as Drs. Morgan, of Tennessee; Fillebrown, of Maine; and Black, of Illinois.

Adjourned.

Evening Session.

Some routine business of no general interest occupied the association for a short time, after which the regular order was resumed, and reports of committees were taken up.

The subject of Physiology being called, Dr. Dean, Chairman, read the report of the committee. The following is an abstract of the paper:

The first subject considered by this report (which claimed to deal only with previously recorded facts or theories) was the rudimentary dental organs of the ruminants. It has been the prevailing belief that the upper jaws of fœtal ruminants contain the germs of the incisors. But this statement, which was made first by Goodsir in 1838, has recently been severely shaken by the researches of Dr. Pietkiewierz, whose observations are recorded by Legros and Magitot. In a long series of experiments he failed to find in the ruminant fœtus even a trace of epithelial lamina. There was, however, an epithelial sac which *appeared* to be the commencement of a dental germ, and which was probably so regarded by Goodsir. Prof. Tomes has corroborated this statement.

The origin of supernumerary teeth has been stated by Legros and Magitot to be the same as that of the temporary teeth,—that is, from buddings from the epithelial lamina. Kölliker, however, assumed that they were derived from the proliferation of epithelial cells at the severance of the cord which connects the enamel organ with the epithelial lamina, which sometimes wander off and assume various forms. This seems to be a satisfactory explanation of the phenomenon.

The question of third and fourth dentition has been also recently discussed by Dr. Magitot, who, after reviewing the literature of the subject, concludes that all such cases must be rejected as apocryphal. He considers these teeth to be either normal or supernumerary teeth, which had been developed at a normal period, but had been concealed till a late period in life. The writer had investigated a late newspaper report of such an occurrence in the mouth of a person seventy years of age, and found the only foundation for it to be the appearance of a molar root, which had risen above the gum.

Magitot gives the physiological obstacles to such an occurrence as follows: in the jaw of the aged person nothing resembles in the least the epithelial band from which the teeth originate, and the loss of all the teeth precludes the existence of a follicular cord. Although the writer had previously given credence to these reports, he was now convinced that Dr. Magitot is correct. Such marvelous reports are spread and given credence by even scientific persons, and made to support their own views. The case of Julia Pastrana, whose body was said to be covered with hair, and whose face was supplied with a beard, was referred to in support of this statement; this person was reported by Darwin as having two rows of teeth, and by other scientists as having "an excessive number of teeth;" but Magitot, having procured impressions of the jaws, says several teeth were wanting, there being but twenty-five in all, while the remainder were irregular. This illustrates the liability to error of scientists of even the present day.

The development of the enamel was next touched upon. That it is an epithelial production is admitted, but the mode of its production is in controversy. Some physiologists maintain that the enamel cells are actually converted into prisms, and others that the enamel is the product of a secretion of these cells. Magitot says the prisms are formed directly from an exudation produced by each cell, which afterwards calcifies. Tomes maintains that although a membrane exists upon the young enamel, it is purely artificial; and in view of facts, it would seem that the theory of the actual calcification of the cells is by far the best supported. There are, however, difficulties not satisfactorily explained. The question hinges on the point whether Nasmyth's membrane is a true or an artificial one. The manner of the deposition of the lime-salts remains to be explained in either case. Whether there are vessels in the enamel organ or not is a mooted point; but in their absence the lime-salts might be derived from the rich plexus of vessels that surrounds it.

Whether the form or configuration of the tooth depends upon the dentine papilla or the enamel organ is a question but little discussed. The former opinion has been generally received, but Dr. Magitot considers that the latter is the true statement; and in corroboration states that the enamel organ considerably precedes the appearance of the dentine papilla. The writer had always supposed the first theory correct,—and the fact that the enamel organs of the temporary molars and permanent bicuspids, which are entirely dissimilar, originate from the same epithelial cord, would sustain the opinion. Though the enamel organ precedes, yet until the dentinal germ appears, it maintains a spherical form,—the cap-form being afterwards acquired by contact with the papilla. This would show that the latter determines the form of the tooth, as would also the fact that the papillæ, from which hair and enamel are developed, are identical, until brought in contact with the respective hair and dentinal papillæ. But careful consideration sustains the views of Dr. Magitot, the main support of which is found in the statement of Drusy, that a semilunar membrane extends along each half of the jaw, some points of which the enamel organ touches, and at such point a dentine germ would result. If the epithelial cords become transposed, a corresponding transposition of the developed teeth will exist. In closing he said that in the foregoing he had attempted to give in a very brief manner the present status of some very interesting physiological questions, without fully discussing or elaborating them, or presuming to decide the points in dispute; and, he feared, without offering much that would tend to their solution.

The subject being open for discussion,

Dr. Atkinson said the report was on Histology and not Physiology. The latest discoveries in this direction, which he hoped to present before the close of the session, will teach something in relation to enamel entirely new. The discoveries had been made in New York during the last three months; they would explain much of previous disagreement, and would show that it is a cell which gives direction to teeth. Every tooth has two compartments, an enamel and a dentinal organ, and when needed, embryonal corpuscles are called into action, just enough, for example, to make a tip of enamel. This will deliver us from the nonsense of ignoring the power by which we live. Membranes do not "find each other" any more than billiard-balls do; there is an unseen cue behind, and a power that moves the cue. All reproduction follows lines, and is under one law. Between the plexus outside and the enamel organ there is a stratum of bone-cells. The enamel organ has nothing to do with it except in a passive way, but the type *has* to do with it. Teeth are not epidermal tissues, as are hair and nails. If there is an abundance of lime-salts in the body the growth will go on, but it is arrested by disease, as shown in rings on the teeth, etc. The bicuspids succeed the multicuspid temporaries by reason of persistency or energy of type; if that was not so, they would follow the type of the tooth from which they are built off.

Dr. McQuillen then read a report from the same committee. This paper detailed the results of an experiment upon a pigeon, from which, February 5th, 1878, he had removed four-fifths of the upper portion of the cerebrum. The usual phenomena attendant upon the operation followed, *i.e.*, profound stupor, the bird standing motionless on the table, with eyes closed, the head sunk between the shoulders and the feathers ruffled. When pushed, it opened its eyes and moved the body, and when thrown into the air it flew a few feet and then, on alighting, relapsed into somnolency with an evident obliviousness to surrounding objects until again aroused by handling. By the first of March, about twenty-three days after the operation, there was complete recovery of the voluntary movements of walking and flying, the general manifestation of intelligence in the fact of feeding itself and drinking as usual. How are we to account for the restoration of these functions? Is it due to the fact that the small amount of cerebrum left after the operation assumed the functions of the entire organ, or has there been a regeneration of the part removed? There is but one other case on record (by Voight), where there has been a recovery of voluntary action on the part of a pigeon from which the cerebral hemispheres had been removed; and I was not aware of that fact until the experience with my pigeon induced me to make a careful examination of the literature of the subject. It must be remembered I only cut out the upper four-fifths of the cerebrum. In doing this, however, the superficial gray matter of the hemispheres, recognized generally as the structure physiologically concerned in the exercise of the faculties of attention, perception, memory, and will, was removed.

Six months after the operation the pigeon was put to death under chloroform, and a *post-mortem* examination made. On removing the scalp a fibrous structure was found analogous to the pericranium, and on opening this a small amount of serous fluid escaped. The cranial cavity thus exposed was found occupied by a white substance resembling the cerebral structure that had been removed. A section of it under the microscope revealed the characteristic bipolar nerve-cells.

Adjourned.

SECOND DAY—*Morning Session.*

The meeting was called to order at the usual time and the minutes read, after which the reading of the regular reports was called for and the subject of Histology was taken up.

Dr. Black, chairman of the committee, read a report,—on "Odontoblasts." He claimed that these bodies are cylindrical, with outward prolongations and lateral processes, and that they cover the entire surface of the pulp. These are special cells, which are not reproduced.

The subject being open for discussion,

Dr. Spalding said that it was one of great practical importance, but had never been practically presented before; it settles disputed questions, and shows the process by which the dentine was originally formed, and by which secondary dentine is formed subsequently. His (the speaker's) previous views had been confirmed by Dr. Black's experiments, though he had not followed the subject closely.

Dr. Waters, of Boston, from the same committee, spoke of some examinations of the fungi of the mouth in which he had been engaged. He had sought in food and food-plants for these fungi, and had found bodies resembling the fungi observed in cavities of decay. In those foods supplied with water these fungi were more luxuriant than in other cases. He had found them in the walnut, filbert, and pecan nuts, and also in the sweet potato.

Dr. C. N. Peirce, of Philadelphia, then read a special paper upon "The Mechanical Genesis of Tooth-Forms."* He was followed by the general report of the Committee on Histology and Microscopy.

This paper embraced the important announcement that W. R. Gowans, of London, England, had perfected an instrument for the counting of blood-corpuscles, whereby it was found that the disproportion of white and red corpuscles was greater than is generally supposed, being in the ratio of 400 red to 1 white, instead of 300 to 1. The use of iron he had also found greatly increases the number of red corpuscles, even to an enormous extent, without improving the health. The augmentation of the red corpuscles was useless without a corresponding amount of hemato-globulin. The report concluded with a reference to the importance of dentists receiving a more thorough and systematic training outside of their manipulative work. The knowledge thus gained is necessary to fit them to deal with those stubborn cases classed under the general head of neuralgia. Microscopes of superior character can now be obtained at very reasonable cost, and all should have them.

At this point the committee on volunteer papers reported that a paper on this subject had been submitted to them which they deemed worthy of a hearing. The paper was entitled "The Distribution of Living Matter in Human Dentine, Cement, and Enamel," and was written by Dr. C. W. F. Bödeker, of New York, a non-member of the association, and a discussion took place as to whether it was within the rules to receive it. The committee having recommended it, however, upon a vote the body concluded to have the paper read.

The subject being open for discussion,

Dr. Buckingham said that he differed with the views already ad-

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* This paper appeared in the September number of the DENTAL COSMOS.

vanced. We must go to the beginning. The foundation of organized tissue is the cell, from which comes another cell similar to the first. This is admitted, but different views are entertained in regard to the cell itself. Virchow says it is a sac filled with fluid; Beale makes it a portion of germinal matter. A simple cell is a monad, and all organs are made up of cells. A monad has all the functions of an animal, but it is without organs. In these little workshops are all the works of nature done. These cells multiply in various ways,—by nuclei and nucleoli, and sometimes by segmentations. The point he wished to make is that cells produce like cells. How the first cell came we don't know. He is opposed to the theory of the spontaneous generation of cells. The dental tube is simply one long cell—not a series of cells—with an odontoblast at the end of it. This cell becomes hard on the outside, and begins to secrete lime-salts. Broken bones unite by throwing out osteoblasts from each side, and the chasm is bridged; all tissues are formed in the same way. There is no necessity that the odontoblasts should come from the pulp. Secondary dentine is simply a second growth of dentine; if protected, he can see no reason why an exposure should not be arched over.

Dr. Atkinson said that those who depended on what had been done and written previous to ten years ago are simply wasting their time. The diagrams presented are false. As you love truth don't say *cell* again. Cells are vegetable products; crystals are mineral; colloid bodies are animal. The amœba is the first form of organic body. (The speaker then exhibited some diagrams which he said were true representations.) They are under the guidance of an energy that knows how much is wanted, and won't take any more; when this type is full we have a healthy organ. No human being is perfect until he has the last epithelial hair complete. The epithelium never proliferates except from the basement membrane; everything must pass through the little door of the embryonal corpuscle.

Adjourned.

Evening Session.

The same subject was continued.

Dr. McQuillen said, prior to reading the paper Dr. Atkinson stated that it would present some valuable discoveries in dental histology. After listening attentively to it, he was not prepared to regard it in that light. He did not wish to be understood as asserting that it contained no new facts, or as undervaluing the efforts of the writer. In place of diagrams, however, the microscopical specimens should have accompanied the paper, to demonstrate the statements made, so that we could examine what was claimed as new. Last year, at

Chicago, Dr. Black showed specimens illustrating points described in the paper as new (if he understands it aright), and some of these specimens are now under the microscopes on the table. He then directed attention to the fact that the hexagonal form of the enamel prisms was due to mutual pressure on the part of the soft round columnar epithelial cells during the formative stage.

Dr. Black said that he had years ago prepared specimens showing things that now were claimed as new. The theory of Carl Heitzmann was ingrafted into the paper that had been read. There may be something in the theory, but it has not yet been demonstrated, and we should go a little slow with it. He (the speaker) has a great deal of respect for cells, and especially for epithelial cells. Differentiated cells have not the power of proliferation; but when cells are excited to take on a special diseased growth, there is a terrible evidence of proliferation. There is a law about the regeneration of cells that we must respect, and when we overthrow the work of ages at one fell sweep, a little caution is advisable. The stellate cells are to the future enamel just what the white of the egg is to the chicken. The books tell us that after the temporary tooth is formed another starts off from it *downward*. He had found that it might come off in an entirely distinct manner, and has specimens showing the connection of the two.

Dr. Dean said that he had seen specimens of Dr. Black's that seemed to show that the cord of the permanent tooth came from the mucous membrane, but the theory of Kölliker and Magitot is that it comes from the sac of the temporary tooth. Magitot thinks that all, except the first permanent molar, originate from the epithelial cord; it comes up and cuts off the cord, so that at the sixteenth week it will seem to originate from the epithelial lamina.

Dr. Atkinson said that there was so much misapprehension and misuse of terms that it appeared to be little use to try to straighten things. If a man thinks he knows all that is known, let him get a class of students and try to teach. The paper he had read was but a mere synopsis of another that would recite all the authorities from the earliest day. All that he claimed as new in the paper was the protoplasmic strings in the enamel of a lady's tooth forty-five years of age. That all the tissues are connected by protoplasmic strings is Carl Heitzmann's discovery. We have been told that cells can perform functions without organs. Heitzmann has set this idea to rights. That the interglobular spaces are connected with fibrils is not new; what *is* new is Heitzmann's interpretation of it. Almost every one *sees* things, but few comprehend them. Men see things with different eyes. There are five or six different kinds of amœbæ recognized,—the jelly-like, nucleated, etc.

Dr. McQuillen. Men starting with preconceived opinions often see only the things that corroborate them, and overlook or ignore facts that would oppose the hypothesis. There are two methods pursued in science: one of reasoning inductively from cause to effect, the other deductively, or looking for the facts to corroborate an hypothesis. Scientific men generally pursue the former as the safest course. The adoption of both methods, in some instances, is invaluable, the one confirming the other. As has been said, it may be that Heitzmann's theory is projected into this paper; on this point, however, until he had an opportunity of carefully reading the paper and examining the specimens, he did not wish to express a positive opinion.

Dr. Atkinson. It's not theory.

Dr. McQuillen. There is no reason why we should be tied to the authority of books. Owen, Kölliker, and Tomes are valuable in showing what has been done, and are entitled to respect as authority; but we should not be content to see with their eyes. Every person in the association has a pair of eyes and should learn to use them in examining the page of nature and reading the truths there presented. The expense of a microscope may be urged as an objection. A serviceable and effective instrument, made by Zentmayer for about sixty dollars, has been shown to you to-day; it would answer your purpose to begin with. The one thousand and fifteen hundred dollar microscopes are too often but costly toys to their possessors.

The subject was then passed.

The subject of Pathology was then taken up, and Dr. Atkinson read his report as chairman of the committee on that subject.

The subject being open for discussion,

Dr. Spalding said that many fluids are called pus, but there is much difference between them. Such fluids as lymph, serum, etc., are called benign pus and may be re-absorbed. He takes the broad ground that no dead thing comes to life again, or can be used for building purposes. If pus is dead blood it cannot be re-absorbed without harm; the paper just read says it can be. Pus-corpuscles and blood-corpuscles are identical; they go back into the blood-vessels again.

Dr. Atkinson. Prove that!

Dr. Spalding. They have been marked and observed to do so by investigators.

Dr. Atkinson. What kind of ear-marks do they put on those corpuscles so that they will know them again? (Laughter.)

Dr. Spalding. Let it pass; these are observed facts. If they are absorbed when dead, they are poisonous materials. It is not so with benign pus, the ingredients of which are ready to be absorbed.

Dr. Atkinson. It is a simple want of knowledge that makes men make such statements. Pus is never re-absorbed for any other than excrementitial purposes. How could those corpuscles be followed in their course? They must pass through the amorphous walls of the capillary tissues.

Dr. Spalding. How are blood-corpuscles discovered if we can't see them?

Dr. Atkinson. We *can* see them but cannot follow them in an abscess. The difference between red and white corpuscles can't be detected in any abscess. When dead in one body matter is alive in another.

Dr. Spalding. If we understand life we can understand death. When motion in a certain way ceases, that is death, but nothing is destroyed. There is really no death in that sense, but when certain forces cease their careers or period of usefulness, that is death.

Authorities say pus is never re-absorbed; but the difference is in the definition of pus. The ideas on this subject are loose and require correction; pus is not definitely defined. A form of fluids called pus *is* absorbed; if not, what becomes of the contents of a closed abscess? Virchow says they are re-absorbed; more modern observers differ, and show that white blood-corpuscles do re-enter the circulation. The term solid is only a comparative one; tissues are permeable, like a wire screen; the corpuscles pass through the coats of vessels without lesions of the coats.

Adjourned.

At the business session held on Thursday evening for the selection of place of next meeting and election of officers, Niagara was chosen as the next place of meeting, and the following officers were elected:

President.—H. J. McKellops, of St. Louis.

First Vice-President.—L. D. Shepard, Boston.

Second Vice-President.—L. D. Carpenter, Atlanta, Georgia.

Corresponding Secretary.—A. O. Rawls, Lexington, Kentucky.

Recording Secretary.—George H. Cushing, Chicago, Illinois.

Treasurer.—W. H. Goddard, Louisville, Kentucky.

Executive Committee.—Drs. C. N. Peirce, G. V. Black, and G. W. Keely.

MILWAUKEE ODONTOLOGICAL SOCIETY.

The dentists of Milwaukee have organized an association under the above title, and adopted a constitution and by-laws.

The membership will be active, honorary, and junior; the active to consist of regular practitioners in the Eastern District of Wisconsin in good standing; the honorary, of non-resident dentists and reputable medical practitioners; and the junior, of students of the active members, who will be allowed to attend the gatherings and participate in the discussions. Officers were elected as follows:

President.—Dr. Arthur Holbrook.

Vice-President.—Dr. A. H. Amos, of Racine.

Treasurer.—Dr. B. G. Marcklein.

Secretary.—Dr. W. A. Fricke.

Executive Committee.—Dr. H. Faville, *Chairman*, Dr. C. E. Babcock, and Dr. Joseph Emmerling.

Meetings will be held on the second Tuesday of each month.

NORTH CAROLINA STATE DENTAL ASSOCIATION.

The fourth annual meeting of the North Carolina State Dental Association was held in the city of Charlotte on Tuesday, September 3d, 1878. After an interesting and harmonious session of three days the association adjourned to meet in the city of Raleigh the first Tuesday in July, 1879. The following officers were elected for the ensuing year:

President.—Dr. E. L. Hunter, Enfield, North Carolina.

First Vice-President.—Dr. D. E. Everitt, Raleigh, North Carolina.

Second Vice-President.—Dr. Isaiah Simpson, Winnsboro', South Carolina.

Secretary.—Dr. W. H. Hoffman, Charlotte, North Carolina.

Treasurer.—Dr. J. H. Crawford, Raleigh, North Carolina.

Executive Committee.—Drs. V. E. Turner, J. W. Hunter, S. S. Everitt.

Committee on Operative Dentistry.—S. S. Everitt, D. A. Robertson, R. T. Couch.

Committee on Mechanical Dentistry.—Drs. L. N. Durham, Julius Lowenstein.

Committee on Dental Chemistry.—Drs. J. H. Durham, I. Simpson.

Committee on Physiology.—Drs. M. A. Bland, R. H. Jones.

Committee on Pathology and Therapeutics.—Drs. D. E. Everitt, R. P. Bessent, E. Floyd.

Committee on Dental Education.—Drs. J. W. Hunter, R. H. Jones.

Committee on Material and Appliances.—Drs. J. F. Griffith, B. H. Garrett, R. F. Robertson.

Committee on Clinical Operations.—Drs. J. H. Crawford, J. W. Hunter, C. J. Watkins, L. N. Durham.

Delegate to Southern Dental Association.—Dr. Isaiah Simpson.

W. H. Hoffman, *Secretary.*

EDITORIAL.

ELEVATING THE PROFESSION.

In the Periscopic department of the current number of the Dental Cosmos we publish samples of the questions pertaining to the *viva voce* examinations of candidates for the license in dentistry by the Royal College of Surgeons in special anatomy, physiology, pathology, and surgery, indicating an examination entitling those who can creditably sustain themselves therein to true professional rank. If in the departments of materia medica, chemistry, metallurgy, and operative and mechanical dentistry the examinations are as thorough as those upon the subjects named, the licentiate of the Royal College should be well qualified for the practice of dentistry as a specialty of medicine.

So far as the subjects named are concerned, these questions form an admirable chart illustrating the special knowledge which the practitioner of dentistry should possess. We commend them to the students of American dental colleges as showing the requirements for the highest practice. Those who can answer fifty per cent. of these questions, and stand as well in the other branches, need not hesitate to accept the title of Doctor.

As we are elsewhere informed in the journal from which the questions copied into our Periscope are quoted, the Board of Examiners in Dental Surgery of the Royal College of Surgeons have resolved, with a view of raising the surgical and general professional qualifications of the dental practitioner, to extend the subjects of their examination in anatomy, physiology, pathology, and surgery. Students will be expected to have a respectable knowledge of the bones; their more important parts and their articulations; the names and positions of the principal arteries, veins, and nerves; the form and relations of the viscera of the head, chest, and abdomen, and of the structure and properties of the principal tissues; of the functions of digestion, absorption, circulation, respiration, secretion, motion, and sensation; the surgical anatomy and physiology of the organs of mastication, deglutition, taste, and articulation; of inflammation and its consequences; of the healing of wounds; of the methods of arresting hemorrhage; of the union of fractures; of the signs of asphyxia; of the administration of anæsthetics, and the treatment of threatened death from their employment; and of the diseases and injuries of the mouth, jaws, fauces, and adjacent parts.

If the standard of qualification in the other branches alluded to, and especially in the mechanics both of office and laboratory, is correspondingly high, the licentiates of the Royal College should be thoroughly furnished for good work. The introduction of new members into the profession qualified after this manner is the sure and only means of "elevating the profession."

BIBLIOGRAPHICAL.

Anatomy, Descriptive and Surgical. By Henry Gray, F.R.S., etc., with 522 engravings on wood. With an Introduction on General Anatomy and Development, by T. Holmes, M.A. A new American, from the eighth and enlarged London, edition. To which is added Landmarks, Medical and Surgical, by Luther Holden, F.R.C.S., etc. Philadelphia: Henry C. Lea, 1878. 8vo, leather, pp. 983.

Gray's Anatomy has long held pre-eminence over all other text-books of anatomy, and indeed seems likely to continue so to do. Under the able editorship of Mr. Holmes and Dr. Dunglison, each successive edition is an improvement upon the preceding. The present edition is, however, a greater advance than has been made in any previous one. Numerous new descriptions and illustrations have been added, especially in the department of histology. The addition of Holden's "Landmarks" is a valuable feature, affording within brief compass exactly the information required by practitioners in the application of anatomical knowledge.

The paper, printing, and binding are of the best quality.

No student either of medicine or dentistry, certainly no practitioner of either, can afford to be without Gray's Anatomy.

OBITUARY.

DR. ROBERT J. FARIES.

Died, in Milwaukee, Wisconsin, May 31st, 1878, of consumption of the bowels, Dr. Robert J. Faries, in the sixty-eighth year of his age.

Dr. Faries was a man of inventive talent and fine manipulative ability, displaying good judgment and artistic taste in mechanical dentistry. He was esteemed as a conscientious, upright man in all the relations of life.

PERISCOPE.

EXAMPLES OF QUESTIONS PUT BY THE DENTAL EXAMINING BOARD OF THE ROYAL COLLEGE OF SURGEONS OF ENGLAND.—*Dental Surgery.*—What is caries, its symptoms and treatment?

Pulp; treatment when exposed by caries or otherwise; capping and destruction of pulp; material used in capping, etc.

The pulp being exposed by caries or otherwise, what would be your treatment? Under what circumstances would you drill into the pulp-cavity?

What escharotics would you use to destroy the tooth-pulp?

What symptoms, local and general, would lead you to diagnose between Inflammation of the Pulp and Inflammation of the Investing Membrane of the Root or Roots of the Teeth?

What would be your treatment for a fungous granulation of the tooth-pulp?

State the pathological changes that occur in the pulp as the result of inflammation.

Periostitis, diagnosis and treatment of.

How would you pivot a tooth? steps of the operation, conditions that might arise, and treatment of those conditions. Pivoting, when contra-indicated.

How would you diagnose idiopathic neuralgia from that caused by a carious tooth?

Practical questions on gold foil, adhesive and non-adhesive, and the different methods of working them; also instruments best adapted for each.

Questions on extraction of teeth, more especially wisdom-teeth.

Questions on extraction of teeth with especial questions on where the elevator is used; how would you use it; in what cases? Would you use it for upper wisdoms? Your reason for not doing so, etc.

The accidents of extractions. Paralysis of inferior dental nerve following extraction, its symptoms; treatment.

Alveolar abscess. What is abscess? What forms the wall of the sac? Where do you generally find it? General course an abscess runs. If you had two teeth equally decayed and an abscess opening between the two, how diagnose the offender?

Regulating cases. How would you turn a tooth besides making a regulating case for it?

Which would you remove, supposing the incisor teeth were very much protruded and all the other teeth were sound and you wanted to bring the front teeth in?

What may have been the possible cause of the protrusion of the front teeth?

What would be your treatment in closure of the jaws by a cicatrix; and what other things may close the jaw?

What are the different stages set up when a tooth aches?

What is the appearance of the opening, supposing the abscess to have burst through the cheek?

How would you diagnose inflammation of the pulp; and if caused by the pressure of a filling, what treatment would you use?

What is the cause of pus exuding from the alveolus and around the neck of a tooth without abscess, and what is the treatment?

Does contraction take place in the jaw after the removal of temporary teeth?

What has been done in the mouths of the models shown?

What is the treatment of chronic hypertrophy of the gums?

What is the treatment of a congested and irritable state of the gums?

Shown specimens and preparations of ossification of the pulp; polypus of pulp, etc., etc., and asked cause and treatment.

Exostosis, diagnosis and treatment of.

What is antral abscess? Is it a true abscess? The origin of the sputum.

Describe the casts numbered 1, 2, 3. and 4; and state how you would treat the irregularities of the teeth which they exhibit.

How would you treat an obstinate case of hemorrhage, after the extraction of a tooth or teeth, locally and constitutionally?

How would you diagnose a tumor in the antrum? What are the leading characteristic signs?

How would you treat a syphilitic cleft palate constitutionally: would you be inclined to have recourse to mechanical appliances?

In an exceptionally difficult case of eruption of a wisdom-tooth, where the first and second molars still remained and both perfectly sound, how would you proceed?

What takes place regarding the growth of the jaws and eruption of the permanent teeth after the premature loss of the temporary front teeth,—say incisors and canines lost from violence at about two years of age? Would the permanent teeth appear in regular or irregular position?

Questions asked on the order and time of eruption of temporary and permanent teeth.

What is the treatment of hemorrhage from the socket of an extracted tooth?

Why does an abscess open sometimes externally?

Shown specimens of *radicular odontome.*

How is it formed, and what is its structure?

What structure is it that probably secretes the fluid in a dentigerous cyst?

Diagnosis and treatment.

What is the treatment for fungous growth of pulp?

Treatment for congested gums.

In what way does aconite act?

Shown a model of a child's upper jaw, with the two central incisors standing within the teeth of the lower jaw, and asked what means you would take to move them into proper position.

Shown a first lower molar of the right side, and asked what tooth it is. How do you know that it is a first molar, and not a second or third?

Shown specimen of alveolar abscess in spirit,—how caused, and treatment? What formed the sac?

Dislocation, unilateral and bilateral, symptoms and treatment.

Shown specimen of epulis in spirit,—how caused, and its treatment? Does an epulis spring from any other tissue than periosteum?

Shown specimen of exostosis,—how formed, symptoms, and treatment?

Explain the pathology of specimen shown, and the cause of the disease by which it had been affected. (Specimen was a lower jaw, the alveoli of which were much absorbed, and there were depositions of tartar upon the necks of the teeth.)

Describe the structure of an epulis and polypus.

What is a dentigerous cyst?. causes, contents, etc.

Can a dentigerous cyst be present without any teeth being absent? if so, give cause.

What is an odontome? give classification.

Earlier stages of alveolar abscess.

Suppose a woman about twenty-three came to you complaining of pains in the neck and arm, and with difficulty in opening her mouth; diagnosis and treatment.

What would be the consequence if this was left too long?

Surgery.—What is a ranula? its appearance.

Symptoms and treatment of tonsillitis.

What is an epulis? appearance and treatment.

Mention some of the tumors which we find in the upper jaw, malignant and non-malignant.

How would you diagnose a tumor of the antrum?

Symptoms of disease of the temporo-maxillary articulation.

Disease of jaws, necrosis, etc. The effects of tertiary syphilis on the bones of the face, soft tissues, and teeth. Tongue-tie, operation for. Diseases of tonsils. Parotitis.

Is it necessary to remove bone in consequence of abscess in the substance of the jaws?

Disease of mucous membrane of the mouth in early years.

Ulcers and their treatment, especially those of the tongue, how caused and treated.

Carious teeth and discharge from the nose, how would you account for latter?

Suppose a young man, say twenty-one, came to you with great difficulty in opening his mouth,—pain and swelling of the jaw, rheumatic pains in the shoulder, etc.,—what would be the cause of this, and state treatment?

What is a dentigerous cyst? what is it formed by?

Have you ever seen the tongue furred? What forms the fur? And, also, what is it caused by?

What would be your treatment of an ulcer of tongue, caused by ragged edge of a carious tooth?

Describe the action of nitrate of silver if applied to an ulcer.

What kind of deposit do you get from the salivary glands, and where does it accumulate in the greatest abundance?

Do you ever get an obstruction of the ducts of the salivary glands? And if so, give the treatment.

What is a ranula? And would you, as a Dental Surgeon, operate for its removal?

Fractures of the jaws, symptoms, causes, relatively frequent parts of the, diagnosis, prognosis, treatment by all the methods used.

Epithelioma of the lower lip, pathology, causes, symptoms, treatment.

State the manner of insertion of harelip pins, and what is the object to be gained by them?

Harelip, treatment. Which harelip pin would you put in first, and how deep would you pass it?

Should they include the mucous membrane of the lip?

State the differences between syphilitic and congenital cleft palate; the treatment to be adopted?

Does the voice become more affected in one or the other, and which is most capable of cure?

Dislocations of the jaw, symptoms, causes, pathology, and methods of treatment?

Is it ever without deformity, and does a partial dislocation ever occur, and at what period of life?

Questions on epulis, diagnosis, pathology, and treatment.

Ulcers of tongue, diagnosis between, 1st, simple ulcer caused by the ragged edge of a decayed tooth, 2d, syphilitic ulcer, and 3d, epithelioma, and the treatment indicated in each case.

Do you get an ulcer of the tongue in primary, secondary, or tertiary syphilis?

Cleft palate, treatment. What muscles do you divide in staphyloraphy? How would you treat a cleft produced by syphilitic ulceration?

What is inflammation? How would you diagnose it? What is the most constant sign of inflammation?

What is abscess? Their diagnosis and treatment.

Would you leave fragments in fractures of the jaw?

Diagnosis and treatment of cystic disease of lower jaw.

How would you tell an exostosis of the superior maxilla?

Why is necrosis less likely to occur after fracture of the upper than of the lower jaw?

What conditions of the teeth give rise to chronic closure of the jaws? How would you treat such closure, and the conditions giving rise to it?

What are the local symptoms of periostitis of the lower jaw? and what are its effects?

Have you seen the superior maxilla removed, and what incisions were made?

About what age does exanthematous necrosis usually occur? Are the permanent teeth lost as well as the temporary in necrosis following the exanthemata?

Give the different causes of necrosis.

How does repair take place in the upper and lower jaws respectively?

In the adult, do we get bone formed in either or both jaws after necrosis?

What are the symptoms of concussion of the brain?

Can you tell if a patient is suffering from concussion or compression?

If a foreign body gets into the larynx what are symptoms and treatment?

If it passes to the lungs which side would it go, and why?

How is tracheotomy performed, and for what purpose?

Pathology, and different forms of dislocation and treatment?

What is otorrhœa?

Have you ever seen a case of abscess of the antrum? How caused, and your treatment?

Have you ever seen chloroform administered? In the event of a patient not recovering, what treatment should you adopt? How does death take place?

How would you diagnose fibrous tumors of the gums? Give their structure, the cause and treatment.

Cancrum oris—how caused? Diagnosis and treatment.

How would you treat fracture of the upper jaw? Which jaw is most liable to necrosis?

Does inflammation of antrum ever occur independently of diseased teeth?

What do you understand by the term necrosis?

What are the causes of necrosis of a bone?

What occurs in acute periostitis?

What would take place if a portion of the body of the lower jaw became necrosed?

What incisions would you make in order to remove the sequestrum, and how would you remove it?

How is the new bone formed?

What diseases have you seen in the mouth?

How would you treat a case of simple stomatitis?

Give a prescription for an aperient.

What are the symptoms of irritation of a tooth?

What are the causes of irritation of the periosteum of a tooth?

What are contour lines?

The structure of the gums?

Exostosis; whether ever vascular?

Various forms of secondary dentine.

Variation in thickness of cementum in different parts of the fangs.

Instruments used for the extraction of the teeth.

Shown several models of irregularity,—how would you treat them?

With crowded mouth what teeth would you remove, and why those in preference?

Describe the ethmoid bone.

Give the openings into the three meatuses of the nose.

Shown a preparation in pickle of half the head and neck cut vertically across, and asked to point out the several structures exposed and cut through.

Definition of an ulcer.

The distinctive characters of a simple, irritable, indolent, and varicose ulcer?

Cause of a varicose ulcer, and its treatment?

What is a granulation?

How do ulcers usually heal?

How would you perform "staphyloraphy"?

When a child accidentally swallows hot water, what is the most frequent cause of death?

Describe a polypus of the nose and mode of treatment.

Dental Anatomy.—Shown model to determine age.

What are supernumerary teeth?

What are supplemental teeth?

Differences in the two classes.

If a tooth is fractured far down in the socket is it likely to unite?

If all the temporary teeth are removed, say at 2½, will jaw become contracted?

What are the different views concerning membrana præformativa?

In degeneration of the pulp, what are the principal changes that occur in vessels?

How is absorption effected?

To what issue does the formation of secondary dentine tend?

Describe the structure of cementum.

Describe the development of dentine; the manner calcification takes place; course of tubes, their terminations and anastomosis; contents of tubes.

Describe an odontoblast cell, and mention the processes, and state their functions.

What is the granular layer?

Describe the development of enamel.

Describe the membrana eboris and arrangement of cells. What part does it take in development of dentine?

Structure of periosteum of socket, and its nerve-supply.

Structure of tooth-pulp, its vascular and nervous supply.

Do you find Haversian canals existing in the cementum in exostosis?

Specimen shown under microscope,—specimen of secondary dentine,—how formed and structure?

Give me the course of the dentinal tubes in the crown, neck, fang, and the fork between the two fangs of a lower molar.

How do the dentinal tubes end in the crown, neck, and fang of a tooth respectively?

Describe the course of the enamel-fibers.

What is osteo-dentine, and where is it found?

How is secondary dentine formed?

What causes the formation of secondary dentine?

In what form does secondary dentine appear in the pulp?

What relation does dentine of repair bear to the pre-existing dentine?

Shown specimens under the microscope of bone, dentine, and osteo-dentine.

Give the arrangement of the fibers of the Gasserian ganglion.

Dental Anatomy and Physiology.—Describe the microscopical structure of the tooth-pulp. Structure and formation of secondary dentine. Under what circumstances does the pulp-cavity become filled with osseous tissue?

Describe structure of cementum and of bone. How would you distinguish one from the other microscopically?

In geminate teeth what constitutes the bond of union?

In what condition are the jaws of a three months' fœtus?

When is primary dentition completed?

In what respect in the early condition of growth are the enamel cement and dentine alike?

What is the structure of the three pulps from which the dental tissues are formed?

In what way do the cells of the three pulps differ, etc.?

Given models to determine ages.

What is the structure of dentine?

Where does calcification begin in the dentine, enamel, and cementum?

At what age do you find the first appearance of dental organs?

When is permanent dentition completed?

Age at which the temporary canine is cut?

How does development take place in each of the three pulps, from within outwards, or *vice versâ?*

Describe the manner of deposition of the earthy salts in enamel, dentine, and cement.

What are the courses of the contour markings in the enamel and dentine?

How do the dentinal tubules end?

What is the surface of dentine like when the enamel has been removed from it?

What is found at the summit of the elevations mentioned?

Questions on the *gums.* Structure, epithelium, and papillæ of gums; blood-vessels to ditto, etc.; nerve-supply, etc.

Questions on the *periosteum*, etc.; structure, etc.

Enamel, structure of, and calcification of enamel fibers, etc.

Questions on dentinal fibers and their sheaths.

Arrangement of nerves and vessels in dental pulp.

Are the nerves of the pulp continued on into the dentine?

Questions on the membrana eboris.

Shown several teeth to give their position in the mouth, and point out the distinctive features of each.

Describe the action of mastication.

Describe the articulation of the jaws in man, the tiger, and the capybara.

What are the specific characters of the cell-nuclei in the formative organs respectively of the dentine, the enamel, and the cementum?

Describe the anatomical condition of the lower jaw in relation to the teeth, both temporary and permanent, in a child five years of age.

Name the different structures of a tooth, their chemical compositions, and percentage of animal and earthy matter.

Dilacerated teeth, shown specimen of, and asked during what period it had occurred?

What is the difference between a supernumerary and a supplemental tooth?

Anatomy and Physiology.—Give the muscles employed in deglutition.

Shown right superior maxilla, asked its bony attachments, and nerve in relation with it.

Point out where the facial artery crosses the lower jaw.

What nerves pass out of the skull through the sphenoidal foramen, and also through the foramen rotundum and foramen ovale?

Where does Steno's duct open, also Wharton's duct?

By how many ducts does the sublingual gland open into the mouth?

What muscles depress the jaw?

What muscles protrude the jaw?

What muscles draw back the jaw?

What muscles fix the hyoid bone?

What muscles protrude tongue?

What muscles draw in and draw back tongue, and give their nervous supply?

Chemical composition of saliva. What other glands besides the salivary situated in the oral cavity, their use and structure. Deglutition, changes of shape undergone by pharynx, etc. Alimentation. Structure and nervous supply of œsophagus and stomach. Gastric juice, composition and use. Structure of a gastric follicle. Nerve of sensation to face. Symptoms of paralysis of the motor nerve of the face. Soft palate. Nerve-supply to upper and lower teeth.

Describe the lower jaw, etc. Temporo-maxillary articulation. Difference in fœtus and adult.

Tongue, structure, and nerve-supply.

What bones enter into the formation of the joint?

How many, and what, are the ligaments of the joints, their origin and insertion?

Is the interarticular ligament ever perforated?

What are the muscles of mastication? Give the origin, insertion, and nerve-supply of each.

Given a lower jaw, to mark out the exact insertions of internal pterygoid, external pterygoid, buccinator, masseter, digastric, etc.

Microscopical specimens shown; what are they, and from what portion of tooth did they come, asked.

Nerve of supply to ear.

Describe actions and use of buccinator. Give the course of inferior dental nerve. Name the muscles of the soft palate, and give their nervous supply.

How does the inferior maxillary nerve leave the skull?

What passes through the foramen rotundum?

Does the superior maxillary nerve supply any of the muscles of mastication?

What arteries supply the incisor and molar teeth of the upper maxilla?

What are these arteries branches of?

Describe the course of the internal maxillary artery with regard to the ramus of the jaw and pterygoid muscles. Name all its branches in which it ends.

What nerves, vessels, arteries, and veins are in relation with the parotid gland?

What does the infraorbital artery anastomose with?

What other arteries supply the face besides the facial?

What does the venous blood of the face enter, and what vein does it eventually enter?

What is the upper surface of the palatal process of the superior maxilla like?

What fits into the groove described?

Give the relations of the vomer.

How is the septum of the nose completed?

Is that septum always straight, and, if not, how may the deviation be accounted for?

In harelip what forms the portion between the two fissures?

How would you treat that portion if much protruded?

Questions on the bones. Nasal bones, articulations, etc. What bones form the hard palate? With what bones does the palate bone articulate, and what fossæ does it enter into the formation of?

Pillars of fauces, what formed by?

Tonsils, situation of, structure, glands of, etc.

Œsophagus and pharynx nerve-supply, etc.

What bones form the septum of the nose?

What bones enter into the formation of the orbit?

What is the distribution of the glosso-pharyngeal nerve?

What is the course of the dental canal? Its contents,—their origin and distribution.

Describe the ramus of the lower,—the muscles connected with it,—their origin, insertion, and action.

Shown preparation to point out Steno's duct, transverse facial artery, and facial nerve. Where does the latter escape from the skull?

Describe the structure of the salivary glands, their situation and relative size, the course and termination of their ducts, and the influence of the saliva on food.

Taken over the cranial nerves, more particularly the branches of the fifth.

How many ducts are there to the principal salivary glands?

Do the cells in the ducts belong to the secreting apparatus?

Are the glands always secreting?

Sinuses of the skull and blood-supply.

What bones close in the opening of the antrum?

What forms the nasal duct?

Is there any difference in structure between lachrymal and salivary glands?

What is there peculiar about the salivary glands?

Point out the bones which enter into the formation of the base of the skull.

What bones form the pterygoid fossa?

How many turbinated bones are there? Which of them exist as separate bones? What are they lined with? The kind of epithelium, and name the openings into the meatus.

Describe how the mucous membrane of the nasal fossa is continuous with that of the œsophagus and larynx, etc.

What is the length of the œsophagus, structure, etc.? Which coat is the thickest?

Describe the movements the pharynx undergoes during deglutition.

Give the relations of the œsophagus.

How many openings are there into the pharynx?

Describe the movements of the larynx.

The length. Trachea: how it terminates, which bronchi is the largest and longest, where do they end, and how many lobes, and the structure of the lungs.

Describe the tongue and its mucous membrane, and enumerate the muscles, intrinsic and extrinsic. Do the anterior ethmoidal cells communicate with the posterior ethmoidal?

Point out the bones that enter into the formation of the orbit.

What foramen open into the orbit, and what structures pass through them?

What is the course and distribution of the orbital branch of the superior maxillary nerve, and is it connected with any other nerves?

What bones bound the spheno-maxillary fissure?

Does the superior maxilla ever articulate with the sphenoid? Explain how it does so.

Name the muscles of the face, and point out their origin.

What do you find beneath the levator labii superioris proprius?

Give me the insertion of the occipito-frontalis muscle.

Give me the course of the facial artery on the face, and name its branches.

Do the coronary arteries lie nearest the skin or the mucous membrane of the lips?

Where does the facial vein commence? and what relation does it bear to the artery? and where does it empty itself into?

How is the external jugular vein formed? Give me its relations, and where does it empty itself?—*British Journal of Dental Science.*

Medical Education.—In view of the present condition of medical education in this country, the subject of this "note" should have special interest to the readers of the *Journal*, which I presume represents the educational opinion of the most advanced State in the Union.

For many years a growing impression has existed, which has at length become an acknowledged fact, that a large proportion of the hundreds of young men who are annually cast loose upon a confiding public, armed with authority to practice medicine, have never been educated even in the groundwork of those studies which are absolutely necessary to fit them to master the great principles of their profession. I therefore welcome the movement now on foot to raise the present standard of medical education, and to place within the reach of students such a course of study that men may be produced far above the present average of ability and genius; men capable of original research, able and desirous to think for themselves; not swayed by every current of opinion, nor yet fossilized into a too rigid adhesion to the records of the past. With this object a new course has been established at Harvard, and at the Universities of Michigan and Pennsylvania; but as there is no organized effort being made throughout the country, Dr. John G. Billings has attempted to systematize the necessary reform in medical education, and has placed his views before the trustees of the "Johns Hopkins University," suggesting to them the proper course to be taken to promote the best results.

In the art or handicraft of surgery we are doing well; the mechanical ingenuity which leads to the contrivance of apparatus needs no stimulation or encouragement, for these things, if successful, meet with immediate pecuniary reward, and it takes a short time to teach how to cut off a leg or to bandage a broken arm.

The case is different with vital chemistry and physics, for in this, to obtain good results, capital is required; capital in the shape of men selected for fitness for the work, *in their training*, which requires much time and leisure. How much remains to be done in this field can be only appreciated by the educated physician, but we can all feel the force of the words of President Eliot: "Who of us has not felt, at some hour of his life, that he would give all he possessed if only the range of medical knowledge could be *even but a little* enlarged; if only it was known how this fatal membrane could be dissolved away, how this hemorrhage could be arrested, how this little clot on the brain could be absorbed." Take the opinion of Leckey, thus expressed: "Of all the great branches of human knowledge, medicine is that in which the accomplished results are most obviously imperfect and provisional; in which the field of unrealized possibilities is most extensive, and from which, if the human mind was directed to it, as it has been during the past century to industrial inventions, and especially to those overcoming space, the most splendid results might be expected. Our almost absolute ignorance of the cause of some of the most fatal diseases, and the empirical nature of nearly all our best medical treatment, have been often recognized."

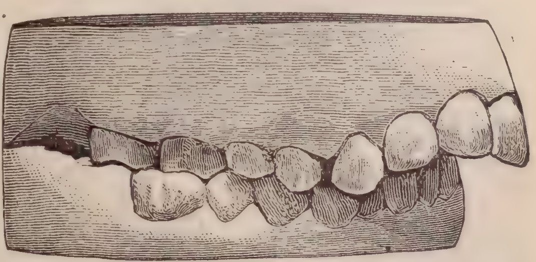
The value of a medical diploma at the present time merely implies that a person has had certain opportunities to acquire knowledge, rather than that it is possessed by the holder of a certificate. Dr. Billings and others demand that the student shall study the "Science of Medicine" as well as the Art. There is a science of physiology, and a fair commencement of scientific pathology and therapeutics, and combining these, we get, not precisely a science of medicine, but the scientific side of medicine,—that which deals with causation or prediction as regards disease.

I can merely hope to draw the attention of your readers to this important subject. Let those who would know more for the purpose of promoting it, write to the trustees of the Johns Hopkins University, at Baltimore, for a copy of Dr. Billings's lectures, published in a pamphlet of forty pages, I presume for free distribution.—*J. M., in National Journal of Education.*

THUMB-SUCKING IN CHILDHOOD AS A CAUSE OF SUBSEQUENT IRREGULARITY OF THE TEETH.—Aside from hereditary congenital deformity, which may itself have originated in this practice, there is no one cause so productive of malformation of the bones of the mouth and irregularity of the teeth as the habit of thumb-sucking in infancy; the different positions of the thumb giving rise to different kinds of deformity.

Generally, on looking into the mouth of a patient brought to him for correction of irregularity of the teeth, the dentist at once perceives what has been its cause from the peculiar features it presents; but at times this special malformation is so disguised by other and more hidden causes that it is difficult to distinguish it.

FIG. 1.

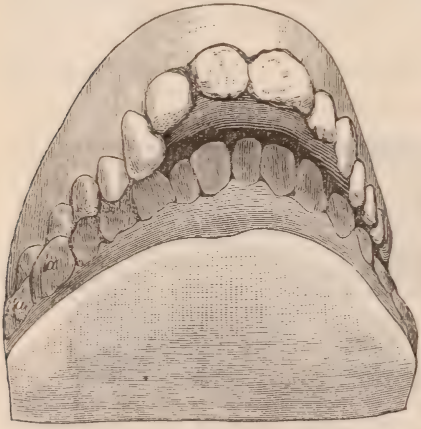


Side view of a model of a thumb-sucking mouth, showing the over lapping upper jaw, an upward curve of the upper incisors, and the articulation of the lower teeth one tooth back of normal position.

In deformity from this cause there is often found in the upper portion of the mouth, just back of the incisors, a hollow in the palatal bones, into which the little victim's thumb has fitted, and which has itself been moulded by and on the thumb. The front teeth are projected forward, sometimes spread out like a fan, but commonly at an angle, overlapping one another, and pushing out the upper lip, giving the face a prognathous appearance, while the whole upper jaw has a stretched look, as though it had been drawn out while soft and become hardened in that position, as indeed is the fact. The bones of the floor of the nares are not infrequently elongated and at the same time narrowed, occasioning a difficulty of breathing through the nostrils, especially when asleep, and many consequent ills; such, for instance, as a collection of dried mucus in the posterior nares in the morning after a long stay in a reclining position, and much trouble at this time in clearing the throat and getting it comfortable for the day. Also from this necessity of breathing through the mouth it must be kept open, and the air currents drying the saliva *in situ* the carbonates of lime or tartar are deposited from it upon the teeth, and left all over them; the dust enters from without, and, mixing with this precipitate, produces that collection of nasty, greenish tartar, so offensive both to sight and smell,—a focus for acidifying fluids and the putrefying *débris* of food. Acids thus formed unite with the lime of the teeth and cause their destruction. The irregularity and crowding of the teeth are therefore seen to be not the only nor the least of the evils caused by this practice.

In the lower jaw a reverse deformity often occurs. From the position taken by the thumb, while the upper jaw is drawn out, elongated, and narrowed, the lower is pushed back and shortened, flattened in front and protruded at the sides, so that the articulation of the lower molars is thrown outside of their corresponding upper teeth, whilst the lower incisors are far inside of their proper position,—an inverse "wapper jaw." The bones of the ramus and of the infantile jaw itself, while soft, are at times literally bent back, causing the bite of the lower teeth to be an entire tooth back of its normal position, while the front portion of the jaw containing the incisors is bent upwards, so that the crowns of these teeth come close to or actually bite into the gum of the upper jaw. This is a kind of irregularity which little or nothing can be done to remedy, and the poor victim must go through life deformed and suffering from the consequences of the ignorance or weak indulgence of parents or nurse.

Fig. 2.

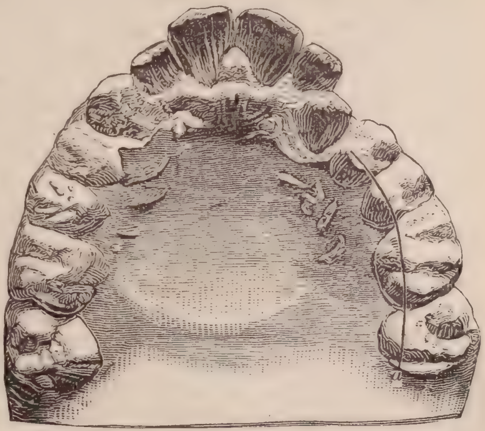


Same jaw from below, showing the upward curve of the crowns of the lower incisors striking the palate. Also the under molars outside of the uppers at *a*.

Not infrequently this bending back of the lower jaw is such that, as the second set are developed, each molar strikes in turn and takes the bearing off from the anterior tooth, until at length the wisdom-tooth takes the whole bearing, and the mouth can no longer be closed, the front teeth being kept apart sometimes as much as a quarter of an inch, entirely preventing proper mastication of the food, interfering seriously with speech, and greatly impairing the looks. The powerful pull of the temporal muscles, and frequent shocks both in the act of mastication and the numerous accidents of life, often set up inflammatory action in these unsupported teeth, and after more or less intensity of suffering cause their final loss. The same process is then set up in the teeth immediately anterior to these, the second molars, and they in turn are lost; and so on, until the patient has no molars for mastication, and all the work of pulping the food comes upon the weak bicuspids and front teeth. The constant inability to masticate properly is a fertile cause of dyspepsia, and it is hard to say where is the end of the disturbances occasioned, if not directly produced, by this apparently innocent habit. Along with the general deformity of the jaws and the malposition of teeth, caused directly by the changes of shape forced mechanically upon the alveolar processes, comes greater or less misplacement of the teeth from the disturbance of the tooth-germs in their infantile cysts; and there is hardly any form of irregularity that may not arise from this cause. Consequent upon the crowding and overlapping of the teeth arises caries with all its train; caries upon the lingual and buccal surfaces, disfiguring them much more than the proximate caries which occurs in the teeth of well-formed and regular mouths.

In the general category of thumb-sucking we may reckon finger-sucking, generally the fore and middle finger; lip-sucking, usually but not always the under lip; and tongue-sucking, which may deform either side or the front of the mouth, according as the child favors one or the other position for its tongue. In this latter case the whole of one side may be pushed out beyond its proper articulation, throwing the upper teeth entirely over and outside of the under ones in such a way that they not only become a disfigurement, but are wholly useless for purposes of mastication. The tongue also buries itself deeply in the soft bones of the palate, and there leaves its mark indelibly impressed, greatly injuring the voice and interfering seriously with, or rendering impossible for life, distinct articulation. These practices are not less harmful than thumb-sucking, inasmuch as they can and do go on at all hours of the day and night, whether sleeping or waking, and from their nature are less susceptible of correction than the latter.

FIG. 3.



Tongue-sucker. *a*, line of contact with under teeth.

The vile practice of some mothers and nurses of supplying children with gingerbread and sugar-teats, so called, for constant sucking, is not only filthy in the last degree, injurious to the digestive organs by keeping the whole length of the alimentary canal filled with a fermenting, acidifying, gas-producing mass, but is the direct cause of the rapid decay of the deciduous teeth from the acids formed from the sugar, always present upon and between them. The effects of sugar upon the teeth are now well understood to be rapidly destructive, confirming the popular belief, which in this as in other cases has been found correct, from its property of rapidly fermenting when mixed with the saliva, and forming lactic and acetic acids. The warmth and moisture of the mouth render it a seat especially favorable for this process, and indeed there is no place where it is more active. The consequence is that these little innocents are the early victims of sensitive teeth, and much of their uneasiness, their tears and lamentations, at this period arise from this unsuspected source. Toothache from inflamed pulps and alveolar abscess soon follows, and the early indulgence for the sake of quietude is more than paid for by the subsequent disturbances. The crowns are lost by rapid caries, and dead roots are left to obstruct the passage of the coming permanent teeth, and turn them aside from their proper positions in the arch, adding this deformity to that caused directly by the presence of the bolus in the mouth, and its moulding the soft and growing bones of the child's palate.

Mothers, in their ignorance of consequences, often encourage all these practices for the sake of their peaceful and quieting effects, and resist every suggestion that tends toward their correction. Even when warned and fully understanding the dangers, they in mistaken kindness, for temporary present good, neglect to provide against certain future evil. Even physicians of long practice have been known to advise mothers to encourage these habits, and when shown models of mouths made monstrous in this seemingly harmless manner can hardly bring themselves to believe that the special case called to their attention is anything more than an exceptional one, instead of being the type of a class. Whenever the practice is discovered no time should be lost in the endeavor to break it up, as it grows with the growth and strengthens with the strength. Even in its earliest stages this is not an easy task. The little one, with its strong sucking instincts, has found that other things besides the nipple of its nurse can give it a sort of comfort, and it sucks indiscriminately everything it can clutch and carry to its mouth,—its toys, clothes, the sheets and blankets of its bed, as well as its fingers, thumbs, and fists,—and no means but absolute confinement of its hands and the prevention of access to its mouth will suffice to prevent it. Anointing the fingers with aloes, pepper, and other bitter and pungent flavors answers but for a time, and soon loses its efficacy, for the child becomes so accustomed to the taste as either to acquire a liking for it, or else overlooks it whilst continuing to indulge in its pet sin. A loose night-dress made of light flannel without sleeves, like a bag, open at both ends, placed over the head and drawn up about the neck, leaving the head out and all the rest of the body within, but the hands free to do anything but go to the mouth, is the only real safety. With this the habit can be corrected, and with this only, and the child suffers no inconvenience or real discomfort, and is not taking constant small doses of which "many mickles make muckle" of drastic cathartics or other medicinal agents. Perseverance in this method will surely effect a cure, and nothing short of an absolute cure should be allowed; for so persistent is the habit that it is not rare to find it retained through childhood and youth, up to adult age, disfiguring the hands as well as the features, and imparting to the whole countenance a look of idiocy. With our modern appliances and methods some of these deformities may be remedied, but not all. Many are absolutely incurable, and the victim may be compelled to carry the marks of this practice and their accompanying discomforts through a long life. The "ounce of prevention is" here much "better than the pound of cure."—*Dr. T. H. Chandler, in Boston Medical and Surgical Journal.*

ANOMALOUS TUMORS CAUSED BY IMBEDDED TEETH.—In 1868 I saw a man, aged forty-two, at the Westminster Hospital, who had a swelling on the lower lip on the left side. He had been told he had cancer, and sought advice on that account. It appeared that he had fallen from a scaffolding two or three months previously, and had sustained considerable injury to his scalp and face, and his lower jaw was fractured. He had been a patient elsewhere, and stated that when he was under treatment he had fits. On examining the part, the lip was found a good deal swollen, and rather tender to the touch. I made a puncture, when the knife impinged on a hard substance, which proved to be a portion of the crown of the left lateral incisor of the lower jaw, which the patient said he missed after the accident. It was decayed at the neck, and had sharp edges. The patient made a good recovery.

Another instance is recorded* in which a canine-tooth was lodged in the thickness of the lower lip simulating a cancerous tumor. The patient was a lady forty years of age, who had always suffered with her teeth, and had but few incisors left, the rest of the jaws presenting roots more or less firmly wedged, and the alveolar processes more or less decayed. Towards the end of the year 1854 she felt a small tumor forming in the lower lip of the left side. Pain was subsequently experienced, and a few months afterwards the patient could hardly eat. She sent for her medical attendant, who made a crucial incision, and discovered a long root of the canine tooth which had been imbedded in the substance of the lip.

Another case is related by Mr. W. H. Folker,† at the North Staffordshire Infirmary. The patient was sixteen years of age, a joiner, and was admitted August 29th, 1867, on account of a tumor existing in the substance of the upper lip. The swelling was on the right side of the mesial line corresponding to the right central incisor tooth (which was noticed to be wanting), and it seemed to be formed by hypertrophied lip. It caused a good deal of deformity, as the patient was unable accurately to close his lips. The tumor felt hard, but was not painful. On carefully examining the swelling, a small aperture was perceived at its base; and on passing a fine probe a hard substance was felt, which was diagnosed to be a tooth. On August 31st, an incision having been made through the tumor, a tooth was found at its base. After its removal the swelling disappeared, and the patient was discharged on the following day.

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* *The Lancet*, May 17th, 1862.

† Ibid., October, 1868.

Mr. Haynes Walton has reported a case* of a patient, aged thirty-five, who, three years and a half before, had a fall, and lost his right upper lateral incisor. He had much pain, and a few weeks later an abscess formed, which discharged through a small opening in the cheek as well as through the alveolus of a lost tooth. Then another abscess formed, leaving a sinus open in the right cheek. On probing this, a hard substance was found. The wound was opened up, and a perfect incisor tooth, lying loose in the antrum, was removed.

I need scarcely add that carious teeth, which may be almost regarded as foreign bodies, give rise, as all surgeons practicing dental surgery are aware, to an endless variety of anomalous symptoms, such as neuralgia, squint, wry-neck, closure of jaws, epilepsy, etc. Mr. Hancock† has reported several such cases. One was a patient whose jaw had been closed for twelve months; a second, a girl affected with wry-neck; a third, a case of supposed tumor of the cheek; a fourth, a case of amaurosis lasting for a month; a fifth, a man who was totally blind in the right eye for eight months; and a sixth, a patient with strabismus and ptosis. Mr. Adams Parker‡ and Mr. Samuel Smith§ have contributed similar examples.—*Lettsomian Lectures, by Francis Mason, F.R.C.S., in the Lancet.*

Obstinate Vomiting due to a Deposit of Tartar.—E. M. S., aged twenty-two, a domestic servant, tall, fairly developed, and well nourished. Had never been very strong, but, with the exception of some dyspepsia, had enjoyed pretty good health until about two months before I saw her. She had then had a feeling of constant nausea, which gradually increased to occasional retching, and at length to almost persistent vomiting. She tried for a time the usual domestic remedies for biliousness, and then her mistress called in a medical man, who prescribed effervescing medicines, etc., without much effect. The nausea and vomiting went on, and she became rapidly weaker from inability to retain a proper amount of food. One morning she noticed that her tongue was getting sore underneath, and two or three days afterwards severe bleeding suddenly occurred, the blood welling up from under the tongue. The doctor was sent for; but, having no appliances at hand to stop the flow, the girl was removed to a local hospital, where, after some abortive attempts to secure the vessel, the bleeding was definitely stopped by the application of styptics and a pad. But, as she was now too exhausted from the loss of blood as well as the almost constant vomiting to keep her place, she was sent home, and I was asked to see her on Jan. 2d, 1877. I found her lying in bed, very pale and weak; pulse rapid and feeble; respiration sighing; temperature normal. Examination showed lungs and heart to be healthy; but there was a loud *bruit de diable* at base of neck. The breath was very offensive; but the tongue was clean, and, like the gums, completely blanched. Under the tongue was a small but rather deep ulcer, which had evidently eaten into the ranine artery on the left side, and caused the hemorrhage. As I was feeling for some rough point to account for it—the examination being made by candle-light—I at first thought that the girl was wearing a very badly-made lower set of artificial teeth; but a second look showed that what I had mistaken for the vulcanite base was really an extraordinary deposit of tartar, blackened by the styptics that had been used, and which half filled up the sulcus between the jaw and the tongue, pushing that organ upwards and backwards, and accounting alike for the vomiting, the ulceration, and the bleeding. The next morning I easily removed the mass in three pieces with an elevator. It was semilunar in shape, reaching from one first bicuspid to the other, about .4″ in thickness in the center, and weighed 70 grs. It was quite smooth on the lingual surface, except where it touched the frænum, but very rough and spongy next the gums, which were swollen and bleeding, almost entirely detached from the teeth, and covered with an offensive discharge. There was also a considerable deposit of tartar on the labial side of the gums, which I removed at the same time. The nausea ceased immediately: but the teeth were left so loose and the gums so tender that no solid food could be taken for some days. This difficulty was, however, soon got over by the use of local astringents, and the girl was rapidly regaining strength when typhoid fever set in, and she nearly lost her life from profuse hemorrhage from the bowel on the twelfth day. But she survived it, and, after a tedious convalescence, is now in perfect health.—*G. F. Masterman, in The Lancet.*

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* *Medical Times*, November, 1869.

† *The Lancet*, 1859.

‡ *The Lancet*, vol. i., 1862.

§ Ibid., vol. i., 1857.

Gouty Teeth.—Dr. W. Stewart said that, in consequence of an allusion to gouty teeth by Dr. Fothergill at the last meeting of the society, he had taken casts of the teeth of eleven gouty patients. They were selected, not on account of their teeth, but on account of their gout and their family history of gout. The casts were exhibited. In all, the teeth were thick and solid, and worn down at the edges. Dr. Fothergill said these teeth had first been described by the late Dr. Laycock, of Edinburgh. In the casts, the teeth presented a generic resemblance that was unmistakable. They were all solid teeth. The wearing down was probably due to the presence of uric acid in the saliva. Mr. Sewill said his attention had been drawn to gouty teeth. He should say they were not pathognomonic; but they were sufficiently pronounced to form an aid in diagnosis. The president said the subject was a very interesting one.—*Harveian Society Reports, in British Medical Journal.*

Death from a Carious Tooth.—A singular case of death lately took place at the Lariboisière Hospital under the following circumstances. The deceased, a boy aged seven, was admitted into the hospital complaining of pain in the head, accompanied with a tendency to stupor. His eyes were somewhat prominent, but nothing else remarkable was noticed in the patient. About a month after admission, coma set in, and this was accompanied with high temperature, which carried him off. A small hard body was felt over the right eye, which was supposed to have been the cause of death. At the *post mortem* examination, the real cause was traced to a carious tooth, one of the inferior molars, which caused an abscess in the jaw. The inflammatory process extended along the dental nerve, entered the skull through the orbit, involving the durá mater and the brain. The latter contained two or three abscesses, and the bones of the skull were necrosed to a considerable extent. An abscess was also found in the heart. This case would show how important it is to attend early to carious teeth, and to have them removed as soon as inflammatory symptoms become evident, and not to tamper with them by "stopping" or other useless means frequently resorted to by dentists, to the detriment of the patients' pockets, if not of their health or life.—*Paris Correspondence of British Medical Journal.*

THE REGISTRATION OF DENTISTS.—The Dental Act came into operation on the first of the current month, and immediately afterwards the executive committee of the General Medical Council held a meeting for the purpose of taking action thereon. It was found, upon examination of the act, that the Council had been saddled with responsibilities and duties which it would never have dreamt of undertaking if it had known of their existence, but the bill had been allowed to pass without due consideration while the Council was dazed by the questions arising out of the Medical Amendment Bill, and there is now no help for the dilemma into which the Council has gotten itself. Accordingly it was decided that a special meeting of the entire Council should be called for the middle of October, and that, meanwhile, the registration of dentists should be proceeded with. We hear that the registrar is overwhelmed with letters of application and inquiry, and, inasmuch as the registration of dentists for Ireland and Scotland is not to be effected in those countries, but in London, we can readily understand that the office in Oxford Street has its hands full. We presume that the registration will be wholesome. By the terms of the bill (Sec. 6) every person is entitled to be registered who—

(*a*) Is a Licentiate in Dental Surgery or Dentistry of any of the medical authorities.

(*b*) Is entitled to be registered as a Foreign or Colonial Dentist; or

(*c*) Is, at the passing of this Act, *bona fide* engaged in the practice of dentistry or dental surgery, either separately or in conjunction with the practice of medicine, surgery, or pharmacy.

The *bona fides* of any applicant is to be determined by the following declaration, which is "required to be made by a person who claims to be registered:"

"I, John Smith, residing at 14 Waterloo Street, Sheffield, hereby declare that I was *bona fide* engaged in the practice of dentistry at Sheffield at the passing of the Dentists' Act, 1878.

"Signed JOHN SMITH.
"Witness WILLIAM ROBINSON.

"Dated this 26th day of August, 1878."

This declaration the registrar may verify, under the 7th section of the act, by an affidavit, but there is no indication whatever in the act as to what is to be held to constitute "*bona fide*" practice. That is left altogether to the conscience of the applicant, and the registrar has no power to refuse registration upon the strength of any idea he may form as to the *bona fides* of dental practice. We know already, as a matter beyond doubt, that the whole phalanx of druggists who have been in the habit of pulling out teeth, or plugging them with cotton-wool or gutta-percha, are included, and intentionally included, within the operation of the act, and are entitled to be officially recorded as dental practitioners. The registration fee will be £2 up to January next, and £5 afterwards, and as there are many tens of thousands of druggists, dentists, and dental mechanics in the United Kingdom, it may be safely assumed that there will be a rush for the "honors" (!) of the dental register.—*Medical Press and Circular.*

HINTS AND QUERIES.

"He that questioneth much shall learn much."—BACON.

CORRESPONDENTS desiring a reply in this department are requested to make use of *distinctive signatures or initials*, and avoid the practice of signing their communications Reader, Subscriber, etc.

CORRESPONDENTS who wish notice to be taken of their communications should authenticate them with their names. We cannot insert queries or replies except they are so accompanied. Names not necessarily for publication.

IN the report of the Merrimack Valley Dental Association, Dr. T. H. Chandler, of Boston, is reported as saying, "Our modern amalgams have not the preservative quality of the old, which was due to the copper salts which they contained." I would like to ask Professor Chandler the names of these salts, and if they could not advantageously be incorporated with the less preservative modern amalgams.—A.

WILL some one be kind enough to explain the *philosophy* of packing the nerve-canal with cotton under a permanent filling, especially an amalgam filling? Why does a cotton filling, under such circumstances, become so offensive?—F. C. T.

WILL some one please inform me how to prevent dark joints between sectional teeth, caused by the penetration of the rubber? There are places where English rubber cannot be employed, as when the teeth are left in the half of the flask containing the model. —W. R. H.

WILL some practical and experienced operator be kind enough to inform me if it would invariably be better, when it is certain that periosteal inflammation will result in abscess, to trephine for apex of root, and at what angle?—W. S. B.

WILL some one experienced in dentistry inform me in regard to the following case?—Mr. J., age twenty-nine, general health good, presented himself a few weeks ago, desiring the extraction of his four sixth-year molars, the crowns being partially destroyed by caries. Found the alveolar process very unyielding, but extracted the teeth with forceps without difficulty and without breaking any of them, though considerable force had to be employed. Saw the patient about fifteen days after the operation. There was a fungous growth in the socket of the left superior molar, and a copious discharge of exceedingly fetid pus from the left nostril. I passed a trocar through the socket of each root, I suppose, into the antrum, so as to invite the discharge in that direction, but without success. Saw the patient a few days ago; the discharge still continues, though not so excessive nor so offensive. No abscess existed previous to extraction; no fracture of the processes can be discovered. What is the cause, and what treatment is indicated?—I. H.

I READ on page 466 of Taft's "Operative Dentistry" that "pure nitrous oxide will sustain respiration for an indefinite time." Is this true? And why should it be diluted "more or less with pure atmospheric air"? The author says, "to a patient in an anæsthetic state it is not so readily administered as chloroform or ether." Why administer at all when the patient is "in an anæsthetic state"?

What "more heroic" anæsthetic could he refer to in paragraph No. 2, page 467? Is not the entire article on nitrous oxide a little mixed?—STUDENT.

REPLY TO O. D. F., in August DENTAL COSMOS.—The patient could use the tooth for eating with perfect ease four weeks after the transplanting. The tooth (being a superior cuspid) was held in position by tying around it, *above* the base of the crown cone, white floss-silk, and then tying to that white floss-silk, and attaching to first bicuspid and lateral incisor, tying to these *below* the base of the crown cone. In this way, if properly adjusted, just enough pressure is created to hold the tooth nicely in position. The ligatures were kept on two weeks. I saw the patient last evening, and he tells me he experiences not the slightest trouble, and it is now six months.—G. R. THOMAS.

REPLY TO "DIX," in August number of DENTAL COSMOS.—Paint the gum all round the tooth over with spirit of chloroform two or three times; the formication produced, together with the assertion from the dentist that it will lessen the pain, has, as a rule, the effect desired.—PERCY MAY, M.R.C.S., *England.*

CROWDED DENTURES.—Answer to "Dentos," who asks concerning the advisability of extracting teeth for relief in over-crowding.

Observations extending over a period of twenty-five years have satisfied the writer that in what are called perfect arches, so many as two, four, or even more teeth may commonly be sacrificed at a permanent gain to their owner. Undeniably does this apply to the classes of teeth described under the heads 2 and 3 in Garretson's "Oral Surgery":

Class II. "Teeth having a blue shade. Constitutionally such teeth indicate the lymphatic temperament. They are commonly supersensitive, having a softness, yet tenacity, of structure that expresses excess in animal matter. Observation induces the conviction that such teeth are associated more or less intimately, in a hereditary history, with struma. Certain it is, that to preserve such teeth, constant watchfulness is necessary; both as the systemic and local aspect are concerned."

Class III. "Chalky teeth. Teeth of this class are not unfrequently met with having so little either of mechanical or chemical resistance as to suggest a relation with plaster of Paris. As such teeth have in themselves no self-preservative force, an only hope of prolonging their existence lies in antagonizing agents which are injurious to them."

Among the prominent predisposing causes of dental caries is to be enumerated imperfect enamel. Such enamel is to be classified under the head of enamel of imperfect development, and enamel rendered imperfect because of mechanical relations. The second of these distinctions concerns the present consideration of the subject.

Lying upon the table at which this paper is being penned are a number of teeth, apparently perfect, which from time to time have been extracted from crowded but regular dental arches, in pursuance of a practice common with the writer.

Every one of these teeth, examined under a low-power magnifying-glass, presents evidences of imperfect enamel at the sites of contact. All the teeth are extractions made previous to the eruption of the wisdom-teeth.

Now, such examination makes evident the fact that the arches from which the teeth were removed, while apparently normal, were, as a future was concerned, in reality abnormal. The imperfections exposed by the glass, being found alone at the places of contact, could have no other explanation than one strictly mechanical.

It was remarked that these teeth were extracted previous to the incoming of the wisdom-teeth. If already arches of fourteen teeth were found too crowded for healthy development, it must be evident that addition to the pressure made by later teeth could but increase the difficulty; this, particularly as concerns the lower jaw.

In a practice, now so prolonged, the writer has acted upon the rule of relief suggested; saving, after such manner, as he is well assured, arches of teeth which otherwise would have fallen a sacrifice to caries. Besides saving the teeth, other advantages have accrued: teeth well and regularly arranged are easily kept clean; gums in which the circulation is not deranged are insured resistiveness and solidity. Both regularity of arch and freedom in capillary circulation are to be secured by the plan of practice proposed.

It may be urged that such practice is an interference with natural laws. Not justly. The classes of teeth which require the treatment suggested are not in what is to be estimated as the natural relation. Besides this, they are teeth inferior in construction. Young Americans, unfortunately, seldom are to be found possessed of what a physiologist may in propriety designate natural teeth. Perfectly physiological teeth are to be found in the mouths of young Irishmen. The teeth of that race are first-class teeth. Such teeth possess a healthy density, almost proof against mechanical injuries.

That it is common to find a filling in almost every proximate surface of an American's teeth, is known to every dentist. Not less common is it to find such filled teeth uncomfortable to their possessor, and, as well, sources of injury to surrounding parts. How simple the explanation: fillings have been made necessary by the mechanical breaking down of the surfaces; the turgid condition in which the gums are so frequently found is engendered of reflections from irritated periostea. We have seen such mouths where enormous expenses have been incurred by the sufferers, and then nothing better than a semi-healthy condition secured, where we have felt convinced that a timely removal of a tooth from either side of the circles would have corrected disease in the outset, and have given the patients a comfort which an opposite plan of treatment had denied them.

To recapitulate: Under the proper circumstances, it is to be accepted as a judicious hygienic practice to remove from the dental arch two or more teeth for the purpose of affording room to the remainder.

It must be evident, however, to every practitioner of any experience, that features sometimes show themselves which render the practice here commended inadmissible. To make an example: Peculiar articulation. It is here, however, as it is in all other departments of practice, that judgment is to be the directing agent.

Cases in contrast illustrative: Miss A., aged 25, presented herself some twenty odd years back to the writer for certain operations on her teeth. Examining the mouth it was found that, with the exception of the first six lower teeth, fillings had been placed in every approximate surface. These operations had been made by a practitioner recognized as one of the most skillful of the profession, and had proved remarkably successful. From the bicuspidati back the V-shaped cut had been made, and the great care given by the patient had preserved both fillings and teeth nicely. Both above and below the arches were perfect; that is, not a single tooth had been extracted. The history, as given by the patient, was that when about sixteen years of age her teeth had commenced to decay on their approximal surfaces, and that when about seventeen they had been operated upon. While congratulating herself on their preservation, the lady complained that her mouth had never felt as comfortable as previous to operative interference; that the contact of hot, cold, sweet, or acid substances gave much pain; that at times she would have a species of sympathizing pain about the parts, this being dull or obtuse, as if the nerves were tired or overtasked. Performing the operation desired, the patient was dismissed.

The consideration of this case it was that first directed the writer's attention to a hygienic treatment by extraction.

One week after the visit above alluded to, a sister, aged fifteen, applied for advice. The arch here, excepting the wisdom-teeth, was also perfect, extremely regular. A slight decay of one of the bicuspidates was the difficulty for which the patient had presented herself. This tooth was removed, much against the patient's wish, as also the fellow of it on the opposite side. Examining the approximating teeth they were seen, as expected, showing evidences of a breakdown. Acting on inferences drawn, the injured enamel was carefully dressed off, and the surfaces thoroughly polished; such operation being repeated in every dental space; the file, however, being dispensed with, floss-silk and fine pumice taking its place.

One month later another sister presented herself. For this patient two fillings were placed, and the four first molars were removed.

The ladies alluded to are still patients of the writer. The first continues to be constantly annoyed; the other two have the comfort of healthy mouths. To the timely extractions is to be attributed the good received in the latter cases.

With the happy aid of instrumentation, as furnished by the dental engine and its swift-cutting wheels, little excuse is left for not anticipating decay in such threatening cases as offer indications for the treatment. Timely extractions, and timely separations—in the instances where exist indications—are means of prophylaxis which no dentist can afford to neglect.—A. B. C.

In the Dental Cosmos for May, George A. Raymond replies to I. P. W., reciting a case in which he treated successfully irregular teeth for a lady aged twenty-nine years. I have just dismissed a case which I successfully treated for a gentleman aged sixty-five years. I would simply say to any one afraid to treat a case of irregularity on account of age, only be more patient and more persevering.—U. L. Blu.

Correction of Errors. The "New Departure."—A writer in the August Dental Cosmos states that "Dr. Chase says stannous gold is in entire electrical harmony with dentos." I never made such a statement. On the other hand, I have stated that neither gold, amalgams, nor tin is in electrical harmony with dentos. According to numerous late experiments their lack of electrical harmony with dentos may be thus tabulated:

Gold	100
Amalgams	66
Tin	50

On a scale of 100 of which gold shows the least harmony.

In the September number of Dental Cosmos one says (in discussion) that the value of tin has been overlooked by the apostles of the New Departure.

I have already published that cubes of dentos, same size, under same conditions, lost in weight as follows, after a few days' immersion in weakly acidulated water:

Those plugged with gold	6	centigrams.
" " " amalgam	4	"
" " " tin	3	"
" " " gutta-percha	1	"
" " " beeswax	1	"
" " " oxychloride of zinc	0	"

These experiments show tin to be the best *preservative* of the metals; its use must be limited to suitable locations, both on account of its color and its weak resistance to attrition.—Henry S. Chase, *St. Louis*.

THE

DENTAL COSMOS.

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ORIGINAL COMMUNICATIONS.

DENTAL PATHOLOGY AND THERAPEUTICS.

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[Entered according to Act of Congress, in the year 1873, by J. Foster Flagg, D.D.S., in the office of the Librarian of Congress at Washington.]

(Continued from page 530.)

BUT it is not only in teeth, the pulps of which have died, and in which the *entire* pulp remains until it is in a putrescent condition, and which are by this means so discolored as to leave little or no doubt as to the source of trouble, that we meet with periodontitis from this cause, but *small portions* of pulp-tissue remaining in fine and inaccessible canals, or at the smaller terminal ends of canals from which by far the larger part of the pulps have been removed, are a very frequent cause for periodontitis in teeth which have been *treated* for exposed pulp, and in which extirpation of the pulp has been attempted.

Experience has taught that a large proportion of such cases are found in teeth which have decayed in positions which have rendered it *impossible* to effect *thorough* extirpation of the pulps from such entrance into the pulp-cavities as was afforded by the cavities of decay, *and yet it had been by these openings that the operations had been attempted.*

I must admit that I have frequently been surprised at the *almost complete* thoroughness with which the mesio-buccal canals of superior molars had been entered from cavities of decay upon the distal faces of these teeth; and even much more so at the respectable efforts which had been made towards a thorough cleansing of mesial canals in lower molars from cavities upon the disto-articulating and even distal faces of these teeth.

I have felt that such efforts were worthy of a better direction, and always regret (when peridental irritation finally ensues as the result of putrescence of such remaining portion of pulp *as had inevitably to be left*) that the time given to such work had not been better spent in the making of a "tap-hole" in such position as would have made a more complete extirpation comparatively easy of accomplishment.

In proportion as the larger part of pulp-tissue has been removed from a tooth, so is the color of the tooth better maintained, and thus the difficulty of making a diagnosis in early stages of irritation is much increased; but when even the earlier symptoms of periodontitis are pronounced, the fact of any tooth *having been largely filled in such position as would have made it very difficult to insure complete extirpation of the pulp*, should cause such tooth to be viewed with suspicion, even though the patient is "sure that the nerve has been taken out."

In such a case it is folly to interfere with the filling, especially if it be in good condition, and it is far better to accord to the one who did the previous operation an ability *in that direction* equal to any effort which could be subsequently made, and thus save time and energy, and more certainly bestow present and future comfort upon the patient, by making a tap-hole, or entering through another filling, in such position as has already been indicated as *proper* while upon the subject of extirpation of the pulps.

I wish to impress the fact that very small filaments of putrescing pulp-tissue, in very fine canals, and very small fragments in terminal extremities of moderately small and tortuous canals, are quite sufficient to cause grave trouble in many cases. It is therefore ample ground upon which to base hopes for cures, that one-fifth the length of lateral incisor canals, or one-third the length of mesio-buccal canals of superior molars or mesial canals of inferior molars, are found not to have been cleansed. I also wish to impress the fact that apparently inexcusable neglect will be very frequently met with; but it must be remembered that, as yet, the *minutiæ* of "treating teeth" is comparatively little understood, except by the few, really well-educated members of our profession, and that even among these the energies of many operators, such as are yet accorded the highest positions in the dental ranks, are so taxed in the purely mechanical direction of the manipulation of gold for fillings, as *necessarily* to leave but a comparatively limited amount of power to bestow in the direction of *therapeutic manipulation.*

In the ordinary practice of operative dentistry, *by far the larger portion of time* is consumed in the preparation and filling of the cavities of decay; while in the practice which I advocate, and which I have the most encouraging reasons for believing that I shall succeed in establishing, *by far the larger portion of time* is consumed in manipulation which has for its object the relief of suffering and the preparation of the teeth themselves in such wise as to guard, to the best of one's ability, against the recurrence of trouble, or to so prepare things as to be in the best possible condition to meet it, should it unfortunately occur.

In fact, the time actually devoted to the preparation and filling of cavities of decay, in the practice which I labor to advance, is *very small* in comparison with that devoted to the *treatment of teeth.*

I believe *this* is the present *need* in dentistry, a need engendered by the prevailing mode of practice, and one which in the future will again result in such change as will eventuate in more equal division of time between those manipulations incident to filling teeth and those incident to treating teeth, which would naturally result from a successful *saving of all teeth.*

To save all teeth *now* necessitates a great amount of therapeutic manipulation in connection with teeth which *need never have required it*, and with the gradual passing away of this necessity (a necessity due about equally to the difficulty of manipulating the material most used for filling *small cavities in all kinds of teeth and in all positions*, and to its incompatibility with tooth-tissue) will also pass away the relative preponderance of this kind of work.

For many years gold will unquestionably be the material most used for filling small and accessible cavities in strong teeth. It has established for itself a deservedly good reputation for such work; but the employment of other materials, *with the recognition by the most intelligent members of the profession that they are so employed because they are scientifically indicated, and are a better means for attaining certain desired results*, will soon place the soft teeth and the inaccessible cavities almost as much within the pale of successful manipulation as are now the more fortunate strong teeth and easy and accessible cavities.

In view of the fact, then, that for some time yet a prevailing practice will make the necessity for much therapeutic manipulation, it behooves us to simplify this to the utmost, and to so direct our efforts as to correct entailed trouble in the most thorough and expeditious manner.

In connection with periodontitis from putrescent pulp,—be the amount of pulp-tissue large or small,—it will be found that the "most thorough and expeditious" method of treatment for relief is the making of a *direct entrance* of *sufficient size* into the pulp-cavity, thus insuring an *easy* and *thorough* cleansing of the canals with the *least possible manipulation.*

This point it is important to keep constantly in mind. *The least possible manipulation consistent with the giving of the required relief is what is indicated.*

Thus, if a gold filling is in the way of a direct entrance into a pulp-cavity, it may not be needful to remove the whole of it, but a simple perforation of the filling may be all-sufficient *for the time.*

If a gutta-percha filling is to be removed, it should not be cut or drilled out, but appropriately-shaped instruments *should be warmed* in the flame of a spirit-lamp or, better, upon the plate of a "high-heat" gutta-percha warmer, because *two* or *three* can be warmed at a time, and with these the filling should be softened and removed without the slightest irritation.

If an amalgam filling closes the desired passage, a *sharp* drill having commenced an entrance, it will be found that the introduction of an *occasional globule* of mercury into the drill-hole will materially add to the ease with which the filling may be drilled, and the drill-hole enlarged, if required.

If an oxychloride of zinc filling is to be removed, it should be remembered that this material *soon clogs the drills*, and thus prevents them from cutting as they should.

If an oxyphosphate of zinc filling is to be drilled, or removed by bur-drills, it should be remembered that this material drills far more easily and expeditiously if it is thoroughly wet.

If it is tooth-tissue which is to be passed through, as has been intimated, the enamel should always be "spotted" first, that the spear-pointed drill may not be dulled by the hardness of that tissue, and that it may not slip about over and off from the polished surface, as it is thus liable to wedge between teeth, wound the gums, and, from the exceeding sensibility of the parts, inflict much serious suffering.

This "spotting" of enamel is best done with the *diamond drills* recently introduced to the profession, and with one of these is very easily, quickly, comfortably, and accurately accomplished. The drill should be kept wet while running.

In the absence of a diamond drill, an *inverted cone* is next best for this operation; it should be *sharp*, and run at *moderate* speed.

By attention to such minutiæ these operations will be performed with much greater comfort to patients, satisfaction to operators, and both present and future benefit to teeth.

During the work of drilling into teeth which are affected with peridental irritation, much relief from the infliction, otherwise incident to these operations, may be afforded by *supporting* the teeth.

If drill-pressure is made inwardly, as is often the case when a lower molar or bicuspid is being drilled, the *thumb* may be pressed upon the lingual face of the tooth, when, if the fingers be raised by widely opening the hand, counter-pressure may be made *without the least interference* with the work.

If drill-pressure is made outwardly, as is the case with superior incisors, counter-pressure upon the labial face of the teeth from the end of the *little finger* will accomplish a like result.

If direct drill-pressure, either upward or downward from the articulating surface of a tooth, is to be made, a piece of thread (preferably book-binders' thread or gilling-twine, for their strength and ease of passing between teeth) may be tied around the neck of the tooth, a loop made with the long ends, and by means of this the tooth be gently drawn down or raised up by the patient.

The application of counter-pressure *in cases of peridental irritation is better made by the patient*, as each one can thus more accurately give just the relief required.

Without entering into detail as to *reasons* for peculiarities of treatment, I nevertheless think it advisable at this time to caution against the too frequent practice of attempted medication after drilling into pulp-cavities or removing fillings in such cases as are now under consideration.

This is *usually entirely contraindicated;* the cause for irritation was the escape of mephitic gas through the apical foramen; the continuance of this has been prevented by the making of a less obstructed outlet. This is generally productive of almost immediate amelioration of suffering,—the peculiar *sensation of fullness*, which is markedly diagnostic of periodontitis *from putrescent pulp*, is decidedly lessened, sometimes passing away almost instantly; a very great change for the better is usually promptly announced, and prudence dictates that we should "let well enough alone."

But more than mere medication is frequently indulged in, and it is not unusual that medication upon cotton twists or cotton pellets is at these times resorted to; *this is very bad;* it is just the very thing which *ought not to be done*,—an *opening* having been proven beneficial, *that opening should not be stopped.*

In place, when upon "treatment of periodontitis," I propose discussing fully the points to which I have merely alluded as we have passed in review the various causes of this disease; but *this one* is an error in treatment which is so very general, that I have deemed it needful to call particular attention to it now, and shall yet feel it my duty to impress it more solidly and explain it most clearly when it is again, in course, properly brought before us.

I have said that *generally* a prompt and decided change for the better is the result of gaining access to the putrescing cause of trouble, be it in bulk, occupying the entire pulp-cavity, or be it in small quantity, as a filament remaining in a canal; but this immediate relief is not of universal occurrence. Indeed, it is quite frequently the case that from *one* to *three* or *four hours*, or even more time than this, is required before comfort is obtained.

In these cases additional local treatment, which will be given hereafter, is indicated.

But, again, sometimes *very little relief* is given by that "opening" which is usually so efficacious,—and sometimes it occurs that, after a short period of comparative comfort, a *recurrence of pain* ensues.

All this will be duly considered hereafter; but it is mentioned in this connection that, with a knowledge of these facts, the student may be the better prepared for a more thorough appreciation of the subject when it is fully presented.

(To be continued.)

THE DISTRIBUTION OF LIVING MATTER IN HUMAN DENTINE, CEMENT, AND ENAMEL.

BY C. F. W. BÖDECKER, D.D.S., M.D.S.

(Read before the American Dental Association, Niagara Falls, August, 1878.)

As long as dry specimens were used for minute examination of the hard tissues of teeth, it was impossible to obtain clear ideas as to the presence and distribution of living matter within these tissues. Dry specimens are *mummies*, in which the basis-substance, infiltrated with lime-salts both in bone and teeth, remains relatively unchanged, but the soft tissues necessarily shrivel and fade away from the moment that a piece of bone or tooth is allowed to dry. No doubt our knowledge of the minute structure of these tissues could be increased by observing, with relatively low powers, dry specimens which have been ground thin and mounted in Canada balsam or Damar varnish. From the moment, however, that we begin to study such specimens with higher powers (about 500 diameters), our task becomes utterly unsatisfactory, inasmuch as only spaces (lacunæ, canaliculi, tubuli, etc.) can be seen, either empty or filled with air or dirt.

No one, I think, will doubt that as long as a tooth is within the jaw and in close connection with the living tissues of the body, it is alive. Morbid processes, especially caries, produce more or less painful reactions in the tissues of the tooth, even before the pulp-cavity has been invaded and an inflammatory process established. It is a daily occurrence that the cutting of apparently healthy tissue, either enamel or dentine, is a more or less unpleasant, nay, painful, manipulation for the patient, especially on the boundary between the enamel and dentine; moreover, the neck of the tooth is known to be very sensitive.

These facts, besides alterations, as produced by foreign bodies brought in contact with dental tissues, viz., fillings of any kind, show that there must be living matter present within these tissues capable of conducting sensations to the nerves of the pulp, and reacting through an inflammatory process around foreign bodies, the so-called consolidation analogous to eburnification in bone-tissue. Many good observers were aware of the presence of living matter in the teeth, nay, some thought of the presence of nerves within these hard tissues. All, however, failed in demonstrating the living matter in its most intricate distribution, partly owing to the wrong method applied to the preparation of microscopical specimens, and partly to a want of knowledge of the arrangement of the living matter in other tissues, especially in bone.

In 1873, Dr. C. Heitzmann (*Sitzungs-Berichte der Kaiserl. Akad. in Wien*) first discovered the minute structure of protoplasm and that of other tissues of the animal body, mainly epithelium and connective tissue. This author describes the net-like structure of the protoplasm thus: "The nucleolus is connected with the wall of the nucleus, and this again with the granules of the protoplasm, by very fine threads, which are to be regarded as the living matter of the protoplasm, while the fluid contained within these meshes of living matter does not possess the property of life." That these assertions are correct can easily be proved by close examination with a good immersion-lens magnifying at least 1000 linear. In micro-photographs this structure is plainly visible wherever a protoplasmic body is in correct focus. Several reliable German microscopists have accepted the described structure of protoplasm as a well-established fact. The structure is identical in all protoplasmic formations, in the simple amœbæ as well as in colorless blood-corpuscles of vertebrates and all protoplasmic bodies (the formerly so-called cells of the tissues) of any description. The author referred to discovered, in 1873, that there does not exist a tissue within the animal body built up by isolated cells, as taught by Theodor Schwann. What was formerly thought to be a cell (a vesicle filled with a fluid and a nucleus suspended therein) has been, since 1861, through the researches of the late Max Schultze, recognized as "a jelly-like mass, —the so-called protoplasm." Since Dr. C. Heitzmann's observations, it is conceded that in all varieties of connective tissue the protoplasmic bodies being imbedded in a mucoid or a glue-giving basis-substance, at the same time are connected with each other by offshoots of the living matter, which spring from the protoplasmic body of the tissue,—the formerly so-called cell,—and traverse the basis-substance in the shape of a net-work. The net-work of living matter present in the protoplasm is identical with the net-work in the basis-substance, the only difference being that the net-work in the latter is a little wider than in the former; and further on, that in the meshes of the protoplasm there is present a lifeless fluid, while the meshes of the basis-substance contain a mucous or glue-giving substance, originating from the chemically altered and solidified protoplasmic fluid. The history of development of connective tissue illustrates the origin of both the living matter and the lifeless basis-substance—at least from the morphological stand-point—in a satisfactory manner.

In the tissue termed "epithelial" there are protoplasmic bodies closely packed together, so much so that the single bodies flatten each other, and each one shows a more or less polyhedral shape. The single epithelial bodies are separated from each other by a cloak of cement-substance, which gives the horny character to all epithelial formations. The said author demonstrated that in all epithelial bodies still endowed with life (except the dry desquamating epithelia on the surface of the body, and of certain cavities of the same) the net-work of living matter is present within the protoplasm, and sends parallel offshoots through the cement-substance, by which all protoplasmic bodies of the epithelium are uninterruptedly connected with each other. What Max Schultze, in 1864, described as thorns of the cement-substance, present in a few epithelial formations only, must be considered as products of living matter piercing the cement-substance in all epithelial and endothelial formations, though often brought to view only by the application of certain reagents.

It is evident that the old cell doctrine is not tenable. The animal body is by no means built up like a chimney or a dwelling, the bricks being represented by the cells. The organism, according to the new doctrine, for which the term "bioplasson doctrine" has been proposed, must be considered as an engine in which all constituent elements are in close contact respectively in an uninterrupted series with each other, in order to enable the whole to perform its duty. A screw, as such, may be regarded as an individual, but if put in the right place its individuality is lost; it works further on for the benefit of the whole. A single screw being loose may produce great disturbance in the action of the machine, and in an analogous way morbid action may separate protoplasmic bodies, and thus produce a great deal of disturbance, either locally or generally, according to the dignity of the diseased tissue.

The bioplasson doctrine thus briefly detailed, seems to me, after several months' study, very plain.

The tissue of the greatest interest to me is bone, which I studied both in the normal and dead or necrotic condition, the results of which I have laid down in the article "Necrosis" (DENTAL COSMOS, May, 1878). To enable the reader to understand what I later on intend to say on the tissues of the teeth, I propose to recapitulate briefly what I found.

The lacunæ of bone-tissue are the spaces in the glue-giving basis-substance, each of these spaces containing a protoplasmic body, with a distinctly visible net-like arrangement, to be regarded as the living matter of the protoplasm. The basis-substance of bone is pierced by canaliculi, which communicate with each other as well as with the lacunæ. I succeeded in finding a much more delicate net-work of canaliculi than observers have hitherto thought to be present.

The protoplasmic bodies, which do not quite fill the lacunæ, send offshoots of the living matter into the canaliculi, although these offshoots are plainly visible only in the coarser canaliculi. The presence of living matter in the finest canaliculi we have to assume, owing to the fact that from the whole periphery of the protoplasmic body within the lacuna there are projecting delicate conical offshoots, which spring with their basis from the protoplasmic body, traverse the light seam between this body and the wall of the lacuna, and are directed with their delicate ends towards the finest canaliculi, where they are lost to sight.

METHODS.

The best method for preparation of bone-tissue for microscopical purposes is doubtless the treatment with chromic acid solution of the strength of a half to one per cent. The same treatment has repeatedly been resorted to by different investigators of tooth-substance. I have used this solution extensively for this purpose, with precautions suggested by the experience on bone. These are, to immerse only a few teeth in a large vessel with a considerable amount of chromic acid solution; to renew the same every third or fourth day, and add, to enforce the action of the fluid, very small quantities of dilute hydrochloric acid. By this treatment the teeth, after a few months, become dark-green from the reduction of the chromic acid to the sesquioxide of chromium. This method is doubtless the best for softening teeth, both human and animal, when still in the jaw. Wonderful specimens can be obtained in this way by cutting bone and tooth at the same time, also for preparing specimens from embryos, in order to study the history of development of teeth. This method is highly recommended, although the chromic acid softens the cement and dentine only to a certain depth, so much so that a tooth kept never so long in the chromic acid solution never is fit to be cut through in its whole width at one time.

The sections so obtained are ready for staining with carmine or hæmatoxylin after they have been immersed in and washed with distilled water, also for staining with chloride of gold, which latter may be done in the following way: thin sections, after having been washed in distilled water for twenty-four hours and thus freed from the remnants of chromic acid, are to be placed in a solution of chloride of gold of the strength of half of one per cent., by means of glass rods, as metals must be avoided in the treatment with chloride of gold. These sections are to remain in the solution for a half to one hour, and must then be thoroughly washed with distilled water and exposed to daylight for several days, when they are ready for mounting in the ordinary way in glycerin diluted with fifty per cent. of distilled water.

The greatest objection to the chromic acid treatment is that enamel never can be obtained in connection with the dentine. If hydrochloric acid has been used in addition to the chromic acid solution, the enamel is almost completely dissolved. If chromic acid alone has been used, the enamel becomes so brittle that it crumbles into small particles under the knife. Under such circumstances the outer surface of the dentine looks as if corroded, or baylike, owing to the curved lines on the boundary between the dentine and enamel.

Lactic acid acts upon teeth, if diluted sufficiently, by dissolving the lime-salts much faster than chromic acid. Specimens prepared in this way, however, in my experience, are not distinct enough for study with high powers; hence a tooth, after being softened with lactic acid, has to be immersed in chromic acid solution for several weeks. But the greatest objection against the use of the lactic acid solution is the formation of mildew in a relatively short time, and the dissolving of the enamel from the teeth.

The only method which enabled me to obtain specimens of teeth provided with all hard tissues is the following: a fresh tooth, or one kept a short time in chromic acid solution, is sliced under water by a watch-spring saw, and ground as thin as possible upon a corundum-wheel of a lathe, always being kept under water. The lamella thus obtained should be placed in a large quantity of chromic acid solution of the strength of half of one per cent. for one or two days, with the view of hardening the soft parts of the tooth and dissolving the lime-salts. After this the specimen may be stained with carmine, hæmatoxylin, chloride of gold, etc., as above described, and mounted in dilute glycerin.

The saturated solution of picric acid in water may also be used for the decalcification of a ground slice of a tooth, though the precipitated acid must be afterwards removed, either by a brush or the blade of a knife. Very handsome specimens can be obtained by staining them with carmine after the treatment with picric acid.

Dentine.

We know that the basis-substance or matrix of the dentine is analogous to that of bone, viz., glue-giving, and at the same time infiltrated with lime-salts. We learned from the researches of E. Neumann that the basis-substance is denser on the walls of the tubuli, and more resistive to the action of strong acids, which cause the appearance of a sheath around each tubule after the solution of the intermediate substance of the matrix between the tubuli. Analogous relations also exist in bone-tissue, in which the basis-substance is decidedly denser on the walls of the lacunæ and Haversian canals.

With low powers we cannot see in the dentine anything but the tubuli, which I propose to term hereafter Dentinal Canaliculi. These canaliculi, as is well known, run in curved sigmoidal lines from the boundary of the pulp-cavity to the periphery of the dentine; they are directed obliquely upward in the crown, and assume a more horizontal direction in the region of the neck, while in the root they remain horizontal or sometimes turn downward to a varying extent. Besides the main sigmoidal curvature, each individual canaliculus exhibits a more or less wavy course in its way through the dentine, and the individual curvatures are, as a rule, very marked on the outer periphery of the dentine.

The dentinal canaliculi reach the outer surface of the dentine only on the circumference, which is covered by enamel, while on the periphery coated by cementum, including also the neck, the canaliculi terminate before reaching the cementum, and are replaced by a fine granular basis-substance greatly varying in its width.

The distribution of the dentinal canaliculi is in the great majority of teeth uniform throughout the dentine, although exceptionally I have met with specimens of dentine in which there were smaller or larger territories devoid of dentinal canaliculi; which latter looked as if arranged in bundles or groups within the basis-substance. This relation is especially visible on transverse sections of the dentine. An irregular arrangement of the dentinal canaliculi is more common in the roots than in the crowns.

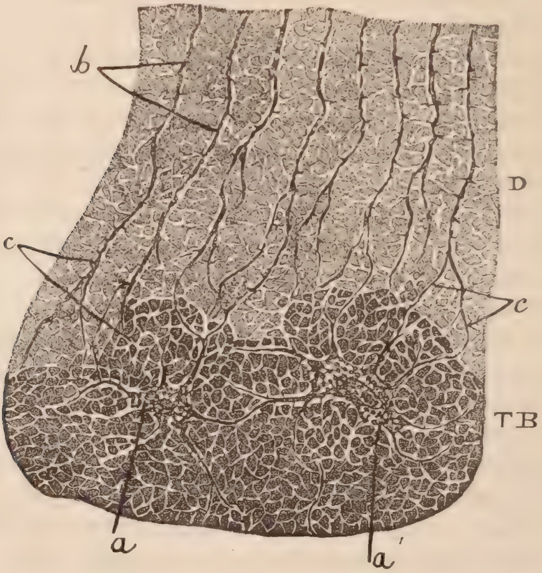
Each canaliculus contains a dentinal fiber. These fibers, when viewed with a power of 500 on good chromic acid specimens, exhibit a pale-gray color, and run through the midst of the tubuli without ramification up to the outer surface of the dentine. The outlines of these fibers never are smooth, but always look denticulated or fringed. On specimens treated with chloride of gold, the fibers and their delicate offshoots show a distinct violet color, characteristic of living matter within protoplasmic formations, while the space between the fiber and the wall of the canaliculus remains unstained, and the basis-substance between the tubuli only assumes a slight violet tinge.

Longitudinal sections of dentine, stained with carmine or chloride of gold, if examined with high powers—from 1000 to 1500 diameters (immersion lenses)—exhibit the following:

The canaliculi of the dentine run in a more or less wavy course through the basis-substance, and are, as a rule, bifurcated only on the periphery of the dentine, both towards enamel and cementum. Each canaliculus contains a central, slightly-beaded fiber, which on its whole periphery sends delicate thorn-like elongations through the light space between the central fiber and the wall of the canaliculus. The thorns are distinctly conical, their bases being attached to the dentinal fibers, and their points directed towards the basis-substance. The smallest thorns spring in an almost vertical direction from the dentinal fiber, while somewhat larger offshoots may run obliquely through the basis-substance, and directly unite neighboring fibers with each other in the vicinity of the enamel and cementum.

The basis-substance shows a distinct net-like structure. The light spaces surrounding the dentinal fibers send delicate elongations into the basis-substance, in which, through repeated branching, a light net-work is established, the meshes of which contain the decalcified glue-giving basis-substance. The finest offshoots of the dentinal fibers can be traced only into the mouths of the elongations of the

Fig. 1.



Cross-section of root of molar. Stained with ½ per cent. solution of chloride of gold. Magn. 1200 diam. *D*, dentine; *TB*, cement (tooth-bone); *a a*, protoplasmic bodies of the cement, branching and uniting; *b*, dentinal fibers, with their transverse offshoots; *c c*, ramification of dentinal fibers and their union with the offshoots of cement-corpuscles.

canaliculi; on the periphery of the latter, owing to their great delicacy, the offshoots are lost to sight. Coarser offshoots of the dentinal fibers, at the localities mentioned before, traverse the basis-substance within its light net-work, at the same time uniting dentinal fibers directly, and sending slender conical offshoots into the light net-work of the basis-substance.

The dentinal fibers are either in direct connection with coarser offshoots of the protoplasmic bodies of the cementum, or the light net-work of the basis-substance of the dentine is in communication with that of the basis-substance of the cementum.

The latter condition prevails on the periphery of the neck of the tooth, where the basis-substance of the dentine is not pierced by larger offshoots of the dentinal fibers, but only by a delicate net-work, through which the connection between dentine and cementum is indirectly established.

Where the dentine is in contact with the pulp, the dentinal fibers directly communicate with the odontoblasts (John Tomes) in a growing tooth, and with the protoplasmic bodies of the pulp in a fully-developed condition, where no regular odontoblasts can be seen.

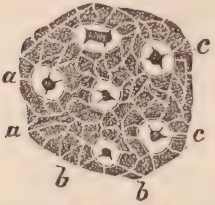
In cross-sections of dentine the dentinal canaliculi are visible in the shape of round or oblong holes; the center of each is occupied by the dentinal fiber, which has the shape of a small roundish dot. Again we see that the periphery of the dentinal canaliculus is sharply marked, and repeatedly interrupted by light offshoots leading into the light net-work which pierces the basis-substance between the canaliculi. The central fibers look very distinct and dark-violet in specimens stained with chloride of gold, and send slender, conical, radiated offshoots through the surrounding dentinal canaliculi, respectively towards the mouth of the light interruptions in their walls.

In directly transverse sections, one, two, or sometimes even three such offshoots can be seen in a star-like arrangement. Each offshoot springs with a broad base from the central dentinal fiber, while its pointed end always is directed towards the perforation in the wall of the canaliculus, where, as a rule, it is lost to sight. Slightly oblique sections of the canaliculi exhibit both transverse and longitudinal projections of the dentinal fibers. In such an oblique section, we may succeed, by cautiously changing the focus, in seeing star-like radiated offshoots up to five in number, all arising from a single dentinal fiber.

Towards the boundary between dentine and enamel, and dentine and cementum, as is well known, the dentinal canaliculi ramify, and according to their ramifications also the dentinal fibers bifurcate, becoming thinner the nearer to the surface of the dentine. Both longitudinal and transverse sections of this part of the dentine show details identical with the main mass of the dentine, the only difference being that near the periphery of the dentine the fibers are more delicate and more closely packed together.

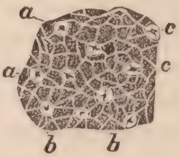
In some teeth I have met on the periphery of the dentine of the crown with the so-called "Interglobular Spaces" (Czermak), which may be considered as remnants of the embryonic condition of the dentine. They represent lacunæ of greatly varying sizes, bounded by curved lines, the convexities of which are directed towards the central cavity. These spaces sometimes contain protoplasm,—that is to say, embryonal elements which have not been transformed into basis-substance and not calcified. The dentinal fibers enter the protoplasmic bodies, and each fiber is united with the net-work of the protoplasm by means of delicate thorn-like projections. At other times the basis-substance of the dentine is developed within the interglobular spaces, but devoid of lime-salts. In this instance the dentinal fibers, without investment and without changing their course, pierce the basis-substance and send offshoots to this through the surrounding light spaces.

FIG. 2.



Cross-section of dentine of incisor. Stained with ½ per cent. solution of chloride of gold. Main mass of dentine. Magn. 2000 diam. *a a*, dentinal canaliculi with the central dentinal fiber, *c c*, the latter with star-like offshoots; the basis-substance between the canaliculi pierced by a delicate light net-work, *b b*.

FIG. 3.



Cross-section of dentine of incisor. Stained with ½ per cent. solution of chloride of gold. View from outer periphery of dentine near enamel. Magn. 2000 diam. *a a*, dentinal canaliculi with the central dentinal fibers, *c c*, the latter with star-like offshoots; the basis-substance, *b b*, between the canaliculi pierced by a delicate light net-work.

The dentine shows peculiar formations in general, though not constantly, as instanced when approaching the enamel and cementum. These formations, however, being in close relation to the covering tissues of the tooth, I prefer to describe in the chapter on cementum and enamel.

(To be continued.)

WHY DO FILLINGS FAIL? THE ELECTRO-CHEMICAL THEORY OF THE "NEW DEPARTURE" vs. DEFECTIVE MANIPULATION AND DEFECTIVE STRUCTURE.

BY W. H. TRUEMAN, D.D.S., PHILADELPHIA, PA.

(Read before the Pennsylvania State Dental Society, at Bedford Springs, August 1st, 1878.)

We have noticed the last few years that failure of dental operations has become a common subject for dental essays, until it threatens to eclipse in popularity that once favorite topic, "dental education." That dental operations, as usually performed, have utterly failed to accomplish the good expected of them is very generally admitted by a majority of those who have discussed the subject. The possibility of saving the teeth is conceded,—there *must* be some cause for failure. Our diligent investigators seem to have now discovered the "last ditch," and in the "New Departure" add another to the long list of evils laid to the charge of that mysterious agent,—galvanism or electricity. What has it *not* been accused of doing? From souring the milkmaid's cream and her temper to exploding steam-boilers; from causing the most trifling ills to the greatest calamities. Whether the electro-chemical or new departure idea explains anything or not; whether the idea itself, or the discussions it has caused, add anything of value to our professional knowledge or not, we owe to its author a debt of profound gratitude. We are no longer obliged to plead ignorance; no longer bear the stigma of defective work; no longer feel, when confronted by a gold filling with a gaping chasm beneath it, there is something lacking in skill and care. Oh, no! We have only to explain the mischievous pranks of this little unknown imp—electro-chemical action—to feel as innocent of any fault as a new-born babe.

We propose to discuss this subject, firmly believing dentistry is not a failure, but a success; and dental operations, considering the difficulties we have to contend with, are doing all we can reasonably expect.

We propose to show that all this new and mysterious electro-chemical theory proposes to account for is readily explained by reasonable, consistent, well-known, well-understood causes. We know gold does and has arrested decay and preserved teeth, not as Dr. Flagg suggests, in places where fillings were not required, in teeth that if let alone would take but little harm, or, as he styles it, in teeth that "did not need saving," but in large cavities, difficult of access,—in teeth that if left alone would soon have been lost. In places, too, where amalgam could not be used; where neither oxychloride nor gutta-percha would serve any but a very temporary purpose.

These are not exceptional cases. From the very foundation of our profession to the present day, when properly handled, so generally has this been the result, the reputation of gold as a reliable filling material is second to none.

We do not admit that there is any noticeable degeneracy of the teeth, and consider that idea, so often advanced to account for the supposed increasing want of success, unworthy of a moment's serious thought. When we consider the countless ages required by slow plodding nature to bring about the *slight* change from monkey to man, the idea that any noticeable change should take place in the structure or character of the teeth in a single lifetime is preposterous.

It is true that the admixture of diverse nationalities and races, the changes of habit and climate, may temporarily depress the vitality of the dental structures—so may advanced civilization by its improper diet, mode of living, and sedentary habits—by preserving the life of imperfect beings to perpetuate their defects and vices in their offspring. But all these causes are temporary and local, self-corrective, and by the usual operation of nature's laws soon die out; except in small and isolated communities, affect individuals and not the masses of population. These slight changes or variations have always existed, and always will. The oldest work on dentistry I have met with speaks of the constant tendency to crowded dentures, the increasing liability to decay, and the "*degeneracy* of the dental organs of the present day," as freely and with as little thought or reason as do more modern publications. The fact that human bodies preserved three thousand years are identical with the living of to-day is sufficient evidence that the great conservatism of nature—that ever-present over-mastering tendency to revert to an original established type—effectually prevents these accidental temporary causes producing any structural or organic changes.

Geology seems to show us examples where changes of surrounding and habit have produced radical changes of structure; but it also as clearly indicates that, so gradual has been the change, the vast periods of time required to accomplish it compared to the historic age of our world is as a thousand years to a day.

There *is a great* change, not in the teeth, but in the profession. The dental profession has advanced in knowledge, in skill, in usefulness. We meet with difficulties and disappointments unknown to our fathers. We have to contend with weak teeth and frail patients, not because they did not exist in the past, but simply because increased skill has given increased confidence. We now perform operations without a thought of failure which our fathers never dreamed of attempting. They, armed with the key or the forceps, struggled with their patients, and with a quick, dexterous jerk ended the contest. We, armed with excavator and plugger, struggle with our patients' teeth, and strive with ever-increasing success to preserve those natural organs our fathers never hesitated to replace with their own handiwork.

Compare the dental literature of thirty, nay, twenty years ago with that of to-day. Then mechanical dentistry was the burden of thought; now, so great is the prominence given to saving the natural teeth, mechanical dentistry threatens to become one of the lost arts.

This is one reason why fillings fail. We attempt more, we risk more, we accomplish more. We sometimes attempt too much, and fail.

Admitting that dentists are not infallible, and dental operations, like all human efforts, liable to failure, we will endeavor to answer the question, Why do fillings fail? by searching for and examining the various causes of failure, and as far as may be, arranging them under the following heads, viz.: 1st, defective tissue; 2d, defective structure; 3d, abnormal surroundings; 4th, defective manipulation.

Defective Tissue.

By defective tissue, we understand defects like those found in teeth denominated soft and chalky. They are generally, if not entirely, due to a depressed state of the system at the time the teeth are developing. This is often associated with (if we may be allowed the expression) a general viciousness of the system. Not only are the teeth defective in quality, they are also defective in vitality; they show no disposition to resist the destructive agents around them. Not only have we these defects in the teeth themselves, but the secretions of the mouth are abnormally destructive. These patients feel pain acutely, have but little fortitude, and possess extremely sensitive teeth. We have here a combination of conditions that tax our skill and patience to the utmost. They call for the best, most perfect work; and yet, so great are the difficulties that we have to contend with, the restlessness of the patient, the difficulty of perfectly cleaning and filling the cavity without injury to the tooth, that we have often to be satisfied with less than we desire, and thus, no doubt, lay the foundation for future failures. Nor does the trouble stop here. These patients, although handled with all possible gentleness and care, suffer so much, that they have a perfect horror of dental operations, and therefore often neglect timely and proper attention. What can we do with these extreme cases? If we attempt to use gold or tin foil, the teeth will not bear the pressure of their insertion without injury, or the restlessness of the patient prevents their proper consolidation. If we use plastic fillings, the best we can do is but temporary, and is often rendered almost useless by the patient's subsequent neglect. It is with this class of patients that dentistry finds by far its greatest number of and most complete failures. This predisposing cause of decay does not always equally affect all the teeth. We often meet with mouths where the front (more frequently the upper, but sometimes the lower) or the back teeth of either or both maxillæ are alone affected. This may sometimes be traced to other causes,—the position of the teeth, or the character of the saliva from the various glands, or from other and accidental causes. But we can readily understand how the cause of the defect may be temporary, existing at one time and not at another.

Very closely allied to this are the changes which occasionally take place in the teeth and their surroundings as a sequel to exhausting diseases. I have noticed it to follow a severe attack of diphtheria, or typhoid fever, or residence in a malarious district. I have noticed it also to follow marriage in females of low vitality, even when they have not borne children, while the old woman's adage, "a tooth for a child," is a recognition of a possible effect this severe drain may have on the dental organs.

It may be a question whether these changes that we notice take place in the mouth after the teeth are developed are really a predisposition to decay, or an increased *activity* of the destructive agents. We agree with Mr. John Tomes in defining dental caries to be, "death and subsequent progressive decomposition of a part or the whole of the tooth." ("Tomes's Dental Physiology and Surgery," London, 1848, p. 199.) Death *must* precede, but is not always followed by immediate decay. When we speak of death or loss of vitality in this connection, we do not mean the complete death, as seen in necrosed teeth or bones; nor yet the condition following the destruction and removal of a pulp. We mean a condition analogous to that following embolism, and its consequent interference with the circulation in a limb. It may range all the way from a very slightly impaired vitality and usefulness to actual gangrene; but in either case it is local, and only affects the general system secondarily.

What is the practical bearing of all this in the present inquiry? Simply this. We take the ground that the cause of the failure of a filling is not necessarily coeval with its insertion. Whatever predisposes a tooth to decay *before* it is filled will predispose a tooth to decay *after* it is filled. A tooth that has once been decayed can never be placed in as good a position to resist decay as it was before the injury. The most perfect filling that can be inserted preserves the tooth only by keeping destructive agents from the part injured. There was a time in the history of every decayed tooth when the part injured was only dead, was only predisposed to decay; and if the injury had stopped then, there would have been no need for a filling. If there is any weak point in a tooth that is filled, it is as likely to be adjacent to the injured part as anywhere else,—the cavity itself cutting off the circulation impairs the vitality of the tissue around it and predisposes it to decay again.

The destructive agents in course of time form a cavity in that portion of a tooth unable to resist them. After the filling is inserted and they are shut out of the cavity, the predisposition still existing in the tissue adjacent to the filling, and the destructive agents still surrounding it, what is to prevent them in course of time *again* forming a cavity under or around the filling, by the same means and in the same way the original cavity was formed? I see none; and therefore say, defective tissue is a cause of failure. And here I take issue with Dr. Flagg when he says in his new creed, "neither separation nor contour has much to do with the final result." In a contour filling the mischief-makers are simply turned out and then invited back again; *if we can* form a solid wall of filling, they can neither get over nor under; we are safe. If we fail to accomplish this difficult and uncertain task, our labor is lost. If a separation is made, they are not only turned out, but their hiding-place is destroyed; if they do come back, they can be seen at once before any harm is done. I have seen too many splendid operations in gold, and useful ones in tin and amalgam undermined; too many cases of irreparable injury only discovered and only *discoverable* when an exposed pulp has called attention to them, to believe contour or separation is a matter of indifference. Contour or separation very often decides the fate of a filling.

Defective Structure.

By defective structure we mean defects in the *building up* of the teeth. The teeth have a history common to all bones: first existing as cartilage, then by the addition of lime-salts beginning at certain points termed centers of calcification, and gradually extending until they meet, coalesce, and become one homogeneous structure, provided nothing interferes with their normal development. It is not our purpose to enter minutely into this subject, we simply desire to trace these defects from their birth until they come under our professional notice. Quite often this coalescence does not thoroughly take place, and we find openings in the enamel,—little lines of imperfect calcification termed fissures. These places are always predisposed to decay. They are often quite minute, and sometimes resist the destructive agents a long time. It may happen in preparing a cavity where these exist that the defect is not entirely cut out, or it may extend some distance into apparently sound tissue, being so slight as to escape the closest scrutiny, and yet in a few years' time may have the result here shown. (Two teeth were shown with amalgam fillings, sawn apart to show the condition of the fillings and the decay around them. The decay had recommenced at the fissure, and extended so as to expose the pulp. The fillings were in good order and had arrested the original decay. A tooth of very hard, dense character was also shown, sawn apart so as to expose a minute crown fissure, extending entirely through the enamel, with decay just beginning in the dentine.) We have reason to believe that when these were inserted every portion of decay was removed and the cavity properly filled. The decay which caused the loss of these teeth was an after-development, and the failure of these fillings to accomplish all that was expected the direct result of the patient's neglect. Had they been seen in time, very little attention would have again made them secure. It is only when we meet the case at this stage that we are able to say definitely what has caused the failure. In a few months' time these fillings would have been dislodged, and the lesson they teach lost with them. There is here no fault in the filling material, no defective work, no error of judgment, but simply an extension of decay, a breaking down of defective structure, the natural result of a weakness in the tooth itself,—a result care and skill may sometimes guard against, but cannot always prevent.

These defects are found in the strongest and most resistant as well as the poorest teeth; but are sooner and more rapidly developed in those that are weak. We sometimes notice them remain for years without change, and apparently without cause decay sets in. Again, we meet with fillings that have done effective service for many years, with decay just beginning to extend along the line of fissures and no apparent change in the filling or its surroundings. Why is this? Is it probable that this defective spot, this imperfectly-calcified portion of the tooth has retained its original nutrient system, and thus, by its more intimate connection with the pulp,—its greater vitality,—has been enabled to resist the encroachment of disease until some change in the tooth has changed its condition?

The treatment of fissures, either on the crown, lingual, or buccal surfaces, should receive our closest care; they are a cause of failure, either immediate or remote, not to be overlooked.

We sometimes meet in the teeth of young subjects a somewhat similar condition, but not as marked, described years ago by Dr. J. D. White as a defective zone around the pulp, very sensitive, and, when decay reaches it, very likely to cause trouble. He termed it the "pith," and supposed the tooth was developed or calcified in two halves, labial and lingual, and the coalescence was not complete until the tooth had been in position some time. It is very likely (as he suggests) that the presence of this defect may account for the extreme sensitiveness of some small approximal cavities in the front teeth, and also may explain why the pulps of such teeth sometimes die under a small filling, or where they have been filled to remove superficial decay.

Dr. James Truman, at least as early as 1866, called attention to the danger of using gold or any other metallic filling in the front teeth of young patients. These teeth are seldom so far matured as to permit filling with gold until about the fourteenth or sixteenth year without seriously endangering the pulp. When attempted at the early age of nine years, no wonder they require renewal, or the patient now has discolored, pulpless teeth. The case of Dr. S.'s daughter, related by Dr. Flagg, is simply an inexcusable error of judgment, perhaps the work of one of those men who introduced their "beautiful jewels of gold, with the view of their premature wreck staring them in the face," in all kinds of teeth, for all classes of patients, year after year. They see the teeth melt from them like snow under the midday sun; they see pulp after pulp die, tooth after tooth destroyed, and learn nothing. Such men have mistaken their calling; they are jewelers, not dentists. The sooner their work kills them or drives them from the profession the better for their patients. We meet with another form of defective structure, especially noticed in the first and third molars, but not confined to them; where the tooth is honey-combed, or has a number of soft chalky spots scattered over the entire enamel surface. In severe cases we have but little trouble; the tooth is either extracted at once or is rapidly reduced to a mere root. But sometimes it gives us a great deal of trouble, and causes a great many failures. These are not always noticed at once; they exist rather as weak places than as cavities. Their constant development, often in the immediate vicinity of a filling, one cavity extending or breaking into another, is a source of great annoyance. These teeth decidedly are candidates for plastic fillings, at least until they have been tested long enough to fairly estimate their value.

As we pass on a little farther in the history of the tooth, we have what may be termed *acquired* defects of structure,—defects of structure developed by its surroundings, in what might otherwise have been a perfect tooth. Some time ago, to test the moisture-tight qualities of fillings, I placed several bicuspids from a crowded mouth in a solution of aniline, such as is used by microscopists for staining, and on removing them after a few days, found the aniline had colored the approximal surfaces where to all appearance the teeth were entirely uninjured. On continuing the experiment, bicuspid teeth frequently stained to a greater or less extent on the approximal surface, just below the point of contact, the very spot where these teeth are so apt to decay. In some cases teeth to all appearances sound, not even discolored, were stained over the entire approximal surface. Does this indicate an injury that precedes decay? On this card are a number of bicuspids exhibiting this, from a slight faint shade to a stain over the entire surface. Also several with decay just beginning at this point. You will also notice in some, that the neck of the tooth at those points grasped by the forceps in extracting, is also stained, although showing no other sign of injury. On making a section of a tooth, the stain is found very superficial. The incisors were seldom affected, the canine only occasionally, while of the bicuspids about eight out of ten were stained on one or both surfaces. I have long thought one reason we have so much trouble saving the bicuspids is from the injury they receive from crowding into place. When we consider their shape, the position they occupy, and the usual condition of the mouth when they are erupted, we will readily see why they are more liable to injury than any others of the series. These teeth approach a square in section, so, if they are subjected to pressure, they do not slide over each other as do the incisors. They form the abutments of the arch. Very often, if the temporary molars have not been removed, they are extensively decayed on the approximal surfaces, and the roots being so much smaller than the crown, when the approximal surface is gone they no longer retain the normal space as here illustrated. (A model made of celluloid and plain teeth, showing on one side the deciduous molars badly decayed and failing to preserve the space, and on the other, the permanent bicuspids crowding into a space too small to accommodate them.) The first molars, urged by the natural tendency of the teeth to move forward, crowd them together; the roots of the deciduous teeth guide the incoming bicuspids into position; they have not the chance to "lap over," as do the front teeth under like circumstances. Almost as soon as they are in position, the canine advances, and being so much wider than that it replaces, helps to increase the trouble. Is it not probable that this pressure, beginning before the tooth is erupted, and perhaps before it is fully formed, continuing a constant increasing strain until it is nearly in position, if it does not actually injure the structure mechanically, may so interfere with the nutrition of that part of the tooth as to predispose it to decay, especially as it often happens that this surface is immediately exposed to the evil influence of a large cavity in the adjoining temporary tooth? We may often notice cases where the first molars have been extracted shortly after the bicuspids are in position, when the bicuspids have promptly separated, to all appearance perfectly sound, yet in a little time this spot discolors, decay sets in, and unless closely watched, we soon have extensive cavities. We also notice that this decay is very penetrating; it may be very small, but quite deep. We often have difficulty in securing good margins after all the decay is removed, the tissue around the cavity crumbles under the instrument, the slightest pressure of the plugger on the edge of the cavity leaves a white spot, indicating that the enamel has been crushed, and even after the filling is in, the file or burnisher may make imperfect edges, unless used with extra care. Does not all this indicate a weakness, a change of structure at this place? How do we know in these cases when we have removed *all* the defective tissue? Is it not probable that there may be a change in the tissue like that which has permitted the stain, or perhaps farther advanced,—a change that will lead to decay *under* the filling as it *has* led to the decay forming the original cavity? Is not this theory more reasonable, more consistent with what we know and see in every-day practice than the incompatibility of gold and dentos? I am fully satisfied this is one cause of failures, and one reason why these teeth are so hard to manage. If it was simply the retention of food, etc., filing so as to leave self-cleansing spaces would be a sure relief; but this is not always the case, nor does decay always recur at the new point of contact. Under favorable conditions and promptly performed, Dr. Arthur's method may be advisable. If the injury is slight it may be effective, but we can never feel sure of it. I have repeatedly separated teeth in this way, very carefully shaping and polishing the surfaces, feeling *sure* that the defect was entirely removed, and in twelve months' time found decay beginning at the same place. In these cases the filing has not been altogether a failure; it has checked the decay and allowed its recurrence to be seen at once, and thus in a measure saved the tooth.

We might enumerate other varieties of defective structure,—the peculiar imperfection in the enamel and its distribution over the crown, probably a sequel of the diseases of childhood, or the form attributed to syphilitic parentage, or the various abnormal conditions associated with the strumous diathesis. We might refer also to the so-called inter-globular spaces, so ably studied by Dr. McQuillen, the cells and fissures in both enamel and dentine described by Tomes, and other deviations from normality these will suggest to you. We only desire to suggest how many mortifying, disappointing failures may, at least in part, be explained, and close this part of our subject by reminding you, just as the strength of a chain is measured by its weakest link, so is the usefulness and permanency of dental operations measured by the strength and endurance of the organs in which they are placed.

Abnormal Surroundings.

By abnormal surroundings we would indicate those changes which sometimes take place in the character of the fluids of the mouth, the result of physical change, disease, or the long-continued use of remedial agents. In a great many mouths there are teeth whose ability to resist destructive agents has been reduced by causes we have referred to,—teeth only waiting for an excuse to decay. So long as the secretion remains near normality they remain intact, but yield to causes that would not affect teeth perfectly healthy.

Remedial agents taken into the system and passing into the circulation are carried into every part of the body, and in many cases produce a marked effect on the secretions. No doubt they are often in a measure neutralized, but I have noticed in my own case that the effect following the medicinal use of the free acids is quite marked. The necks of the teeth become very sensitive, and remain so some time after discontinuance of the remedy. The perspiration is affected, and articles of iron or steel in the pockets are rusted. The effect in the mouth was not due to the contact with the acid, as I always immediately cleanse the teeth with an alkali. How much greater would be the effect if this care was neglected! Iron chloride in such constant use, and usually continued for some time, probably does considerable harm. We meet with difficulty in studying this subject, in dividing the evil effect between the disease and the medicine, and also in bringing together cause and effect. The medicine may begin the injury, which is slowly carried on by other agents, perhaps for several years, before it comes under our notice. There are many other causes which to a greater or less extent affect the oral fluids, but as our purpose is merely to suggest in a general way some of the less noticed causes of decay, and especially those which may be mistaken for the effect of electro-chemical action, these few instances will suffice.

We again repeat, anything that will cause decay in a tooth perfectly sound, will be more apt to do so in a tooth that is filled. No filling can do more than approximately place the tooth in its original condition.

We meet with decay *just beginning* in the teeth of patients quite advanced in years. What is the cause of *that* decay? We admit that there may have been a defect existing the entire lifetime of the tooth, but contend that its development after so many years is evidence of some change in its surroundings. Suppose that tooth had been filled with gold in early life, and after preserving it for ten or twenty years decay begins around it. Which is the more reasonable theory, that the failure is due to incompatibility of gold and dentos, or that the tooth has been predisposed to decay all along, the weakness developing at this time because of some change in its surroundings?

The effect we have supposed to occur after the lapse of ten or twenty years would just as readily take place after one or two, if the same conditions existed, but in this case the real cause would hardly be noticed, and the failure most likely would be assigned to imperfect work.

We may be told that the change in the surroundings has developed the electro-chemical action. If the development of the electro-chemical action requires the same condition that causes decay in a tooth that has never been filled, what harm will it do to lose sight of it?

Defective Manipulation.

Defective manipulation is undoubtedly the cause of very many failures, but we have no doubt it has received credit for more than it is entitled to. In its consideration we dismiss entirely the work of those who put in the very best gold fillings at from fifty cents to one dollar. We desire to consider the work of those only who labor with an earnest desire to do the best they can for their patients.

Poets are born poets, and dentists must be born dentists. Some are so organized that they can, apparently without effort, work with a delicacy and precision others acquire only by dint of constant, persevering attention.

Defective manipulation in forming the cavity may consist in, first, not securing room to work. Where this is the case, it will be an embarrassment from beginning to end; second, in not removing all the disorganized tissue, especially at the cervical border and in fissures; third, in not shaping the cavity so that every part can be thoroughly filled; and, fourth, oversight in not removing or protecting weak edges. In this connection we call special attention to the cervical margins of approximal cavities, especially of the posterior teeth. The form of the cavity often leaves this a sharp edge, not only weak from want of substance, but, being at the point where the enamel overlaps the cementum, liable to splinter or chip. It is difficult alike to reach and examine. In these cases we have four points to remember: first, to remove all defective tissue; second, to secure a strong edge; third, close adaptation of the filling; and, fourth, accurate finish. These in many cases are difficult, and if not secured would be apt to furnish an argument in favor of the electro-chemical incompatibility theory.

In inserting the filling, we have first to secure sufficient solidity to resist any force likely to bear upon it; second, to shape the filling so as to ward off destructive agents; third, to secure close adaptation so as to exclude destructive agents; fourth, to strengthen the tooth as much as possible; and fifth, to preserve as much as possible its natural appearance.

Important as is the preparation of the cavity and insertion of the filling, not less so is the choice of material. Nearly all the cases Dr. Flagg mentions in his paper where gold has failed, and which he uses as arguments in favor of the incompatibility of gold and dentos, are evidently errors of judgment in using in weak, frail teeth a material requiring more force to impact than they were able to bear without injury. The mere act of putting in a filling is mechanical; its form and finish the result of mechanical skill. When and where to fill, what to use and how to use it, are questions demanding the judgment of an educated dentist. The dentist shows his professional knowledge in suiting the filling, both in form and material, to the tooth and cavity, just as much as the physician shows his skill in suiting the treatment to the patient and the disease.

Errors of judgment are a fruitful cause of failure, not only in dentistry, but in all the varied walks of life.

On the subject of moisture-tight fillings much has been said. It seems strange that nearly all the experimenters in this direction should spend their time on glass tubes, blocks of bone or ivory, etc., and neglect the teeth themselves. Any one who desires can obtain a supply of these; and certainly teeth out of the mouth are much nearer teeth in the mouth than a tooth-brush handle or the stem of a meerschaum pipe, at least in character. Dr. Flagg exhibited a block of ivory in which he had tested gutta-percha, and found it leaky. I have repeated the experiment and found the leakage in the *ivory*, not in the filling. I do not know whether the aniline used is unusually penetrating or not, but I find few teeth immersed in it any time without the dentine or cementum being stained; in many cases every particle of dentine is tinged. In several cases a gutta-percha filling was inserted in a cavity at the junction of the enamel and cementum, and on removing the filling the cavity was found stained everywhere except that part formed by the enamel. A tooth-brush handle with a series of cavities was so penetrated by the aniline that it would be impossible to say whether the cavity was stained by leakage of the filling or the bone. (The specimen exhibited. Also six others, one a sound tooth split open, showing the dentine stained up to the enamel by the aniline entering through the pulp-cavity; the others showing amalgam and gutta-percha fillings,—the walls of cavity formed by dentine stained by the aniline entering through the pulp-cavity; the margins and part of the cavity formed by enamel not stained; also some fillings of oxychloride cements entirely penetrated by the stain.) When we consider the structure of the dentine, the fact that there is a constant circulation kept up as long as it retains a degree of vitality, and that when dead, the same channels permit the circulation of fluids, the ideal moisture-tight filling—that is, a filling that will not permit, *absolutely* will not permit, any fluid or secretion between itself and the walls of the cavity—becomes almost a myth. It would be easy to make one in a steel plate, but I doubt if it is possible in a tooth; and I have no doubt whatever that the attempt to make them by excessive hammering has furnished more arguments to the advocates of the New Departure than anything else. I have met with cylinder gold fillings doing excellent service, not accurate at the bottom of the cavity, and there discolored, while everywhere else they were accurate and clean. How did that discoloration get there, unless the agent that produced it entered through the dentine? Changes take place in the dentine. Nature makes an effort to resist decay. How could that take place without a circulation of nutrient fluids? The penetration of arsenic, the pink hue of the dentine resulting from a congested pulp, proves the same fact. The discoloration sometimes following the death of the pulp and the action of bleaching agents, the turning blue or black of a tooth with an amalgam filling, are convincing proofs that these channels may remain open after the tooth, or we would rather say the pulp, is dead.

It is essential that the filling should perfectly exclude those agents which cause decay. It is essential that it should be closely adapted, and should stay closely adapted to the walls of the cavity, but I hardly think a space, say the one ten-millionth of an inch wide, would be a matter of much moment.

I have seen many instances where I have no doubt the teeth have been very much injured by excessive malleting to secure perfect results. The mallet in its various forms is a useful, almost essential instrument where much building up is required, but in nine cases out of ten better results can be accomplished by less severe means. Unless care is taken to keep the instrument from actual contact with the dentos, there is very great danger of crushing and bruising the walls of the cavity. Let the instrument have free play with a sharp plugger on the walls of the cavity; observe how rapidly the tissue is disintegrated and ground away by its action, and you then have an idea of the mischief it may do in the hands of a dental pile-driver. You may then understand why and how the teeth melt away from "beautiful jewels of gold" malleted in teeth whose dentinal tubules are unusually large,—teeth brittle in texture,—in mouths unusually acid. These fillings surrounded by the bruised and crushed dentos readily admit the destructive agents, which rapidly cause decay, just as they will cause decay more rapidly on a surface left rough from a coarse file than one highly polished. You may then see why decay does not take place in the same cavity, filled with tin foil which cannot be made hard, and therefore is not hammered so much; or amalgam which is so much softer than dentos when put in and which therefore cannot crush it; or gutta-percha more readily adapted than anything else. This is not theory alone, it is deduced from practice. Many times I have removed on account of decay hard, solid gold plugs not more than two or three years old which had been malleted in, and replaced them with gold used in cylinders with hand-pressure, and after twice the length of service they are still good.

I do not condemn the mallet; I use and appreciate it; but I do condemn its indiscriminate use in all cavities, in all kinds of teeth and for all classes of patients. Some may use it and do no harm, while in the hands of others the electro-mechanical action of the mallet would readily produce the supposed electro-chemical effect on the teeth. We may also mention defects or injuries to the margins of the cavity by slipping or accidental pressure of the instrument while inserting the gold, or minute fracture of the edges while condensing, filing, or burnishing the gold after it is in; also inaccuracy in finishing the cervical edge, so very difficult to reach in approximal, bicuspid, and molar cavities that extend below the gum, as a cause that may eventually end in failure, as "rat-holes" may sink the finest ship. Also in these difficult places the almost impossibility of keeping the gold dry; or the first portion changing its position, if cohesive gold is used may produce a defect sufficient to wreck the finest operation, and yet so slight, so far out of reach, that it may readily escape notice.

And now, gentlemen, we will close this long but incomplete list of causes why fillings fail. As we think it over, and remember every filling has to run this long gauntlet, and remember the great difficulties we often labor under from position of the cavity, the want of accommodation in some patients, and the restless peevishness of others; the troubles from the character or quantity of saliva, the thousand and one things liable to distract our attention at the very moment when our work requires the closest thought; when we remember the great strain on the operator, both mental and physical, the delicacy and precision, the perfect control of nerve and muscle always required, and remember that the being who attempts to master these almost innumerable difficulties is only human, the wonder is not that fillings sometimes fail; it is a far greater wonder that they ever succeed.

(To be continued.)

REGULATION OF TEETH MADE EASY BY THE POSITIVE SYSTEM.

BY J. N. FARRAR, M.D., BROOKLYN, N. Y.

(Continued from page 312.)

VII.

A TOOTH IN AN ABNORMAL POSTURE DRAWN FROM THE DEPTHS OF THE JAW.

ILLUSTRATIVE of what may be accomplished by the Positive System, the following case, among others, was described before the Brooklyn Dental Society, January 14th, 1878, and some of the apparatus used for the operation was exhibited.

This case, which is in some respects especially interesting, has been longer under treatment than would have been necessary under more favorable circumstances, owing to the patient's having been absent from home for long spaces of time, necessitating delays beyond my control. Still the complete, painless success, thus far, is so remarkable, as illustrative of the value of regulating teeth in accordance with physiological laws,* that I look upon it as more instructive than any other case thus far reported in my DENTAL COSMOS papers, inasmuch as it shows that a tooth may be painlessly drawn from abnormal positions in the depths of the jaw and brought into its proper position in the arch without rupture of its nutritive connections.

The patient is a healthy lady twenty-four years of age, of nervo-sanguine temperament, large stature, full features, and moving in fashionable circles of society.

The two upper temporary cuspids (discolored) were yet somewhat firm in the jaw. The left permanent cuspid had erupted between the temporary one and the first bicuspid, which had crowded the left lateral incisor so out of position that it not only lapped over the adjoining central, but it had also rotated in its socket, so that it stood partially edgewise to the front. On the opposite side the permanent cuspid had not made its appearance, but, high up under the lip, there was a small tumor, which indicated the place of the missing tooth. The lower left cuspid had also erupted in the proper line of the arch, and stood between the temporary cuspid and lateral incisor. All the temporary cuspids had taken on a dark hue. The upper temporary teeth were extracted, in order to liberate the imprisoned and overcrowded permanent teeth; the lower cuspid was bleached and retained; the left permanent cuspid was drawn back by means of a device similar to the one shown in the cut on page 20, DENTAL COSMOS, January, 1876. Room was thus secured for the liberation of the lateral incisor, which was subsequently rotated nearly into position by means of a box-wrench, similar to the one illustrated in the DENTAL COSMOS for October, 1877. A curve in the root causing it to lap over the root of the central incisor prevented its being further rotated. There was then left only the right upper cuspid to be dealt with. For the sake of personal appearance it was very desirable to have the dental arch complete, either by the insertion of an artificial tooth or by compelling the natural one to take its proper position. Although this tooth was twelve years overdue, it was hoped that, after the extraction of the temporary one, it would gradually come down into its proper place; but after the lapse of several months, with no sign of its doing so, I determined, if possible, to compel it to move. Having been successful several years before in a similar though less marked case, I made an incision through the gum over the small tumor under the lip, and found the point of the delinquent tooth slightly protruding through the outer plate of the alveolar process, at a point about five-eighths of an inch above the cutting edges of the bicuspid and lateral incisor.

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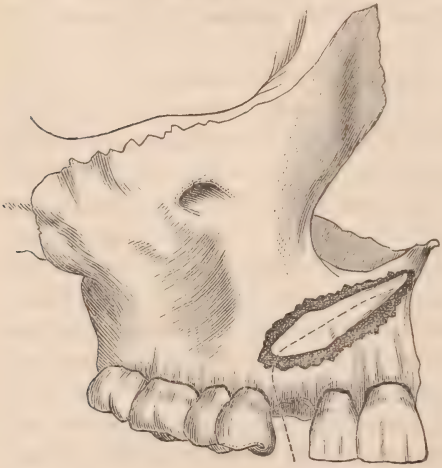
* See DENTAL COSMOS, January, 1876, p. 13.

Dissecting away a small piece of the alveolar process, the position of the tooth was found to be about twenty-three degrees out of the normal perpendicular, with the crown pointing in the direction of the angle between the ramus and the body of the lower jaw. The tooth had also rotated about forty-five degrees upon its long axis, so that, if drawn down into its proper place, it would stand edgewise. It was evident that the abnormal position and posture of this tooth was the reason why it had not erupted. It had become fully developed in this position, and could not change its place. It had grown old in its prison, and become reconciled to its home. The appearance of the jaw containing the delinquent tooth may be clearly understood by reference to Fig. 31.

FIG. 31.

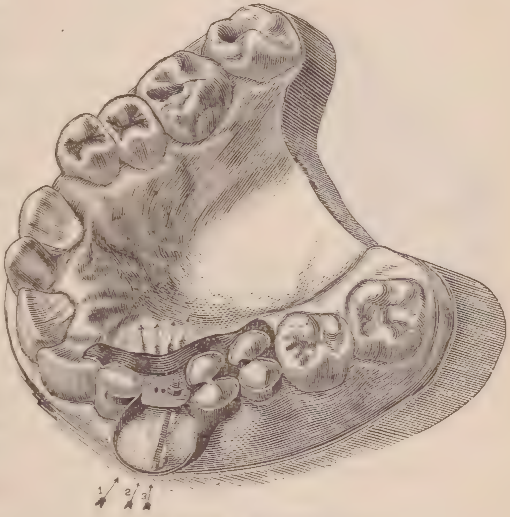


Sketch of the position of the tooth.

Having dissected away the alveolar process so as to expose about one-sixteenth of an inch in width, extending from the point to midway of the crown of the tooth, a pit was drilled into the enamel at a distance from the cutting-point of about one-half the length of the crown.

A skeleton gold plate (Fig. 32) was then swaged so as to rest along the lingual and buccal margins of the gum and walls of the bicuspids and lateral, with thin cross-bars between them, and an open space for the delinquent tooth.

Fig. 32.



View of the first apparatus used.

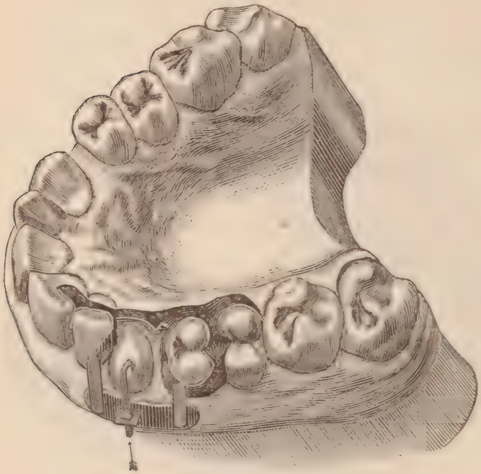
Although the apparatus fitted close to the gum and teeth everywhere else, the plate was shaped so as to bridge the gap between the first bicuspid and lateral incisor on a plane with their cutting edges. In the middle of this bridge was a hole, through which passed a screw-cut wire, bent at its upper end into the form of a hook for insertion into the pit made in the crown of the tooth, which, by means of a nut on the lower side of the bridge, was made to draw upon the tooth. In order to prevent the skeleton plate from rocking, an arch of gold was made to extend from the plate up as high as the pit in the tooth, in order to rest against it and to assist in forcing it down and in.

Everything being in position, a key fitting the nut was given to the patient, with instructions to turn the nut slightly every morning and evening, and to keep an account of the number of revolutions made each time, and to see me once a week.

Gradually the tooth was moved outward and downward, following a curve shown by the dotted line in Fig. 31, due to an occasional change in the position of the hole in the bridge and in the line of draught, until the point of the crown had moved about half an inch, was against the bridge, and within about one-twelfth of an inch of its proper position.

At this period in the operation, the screw-hook had become "fed out;" the bridge could not be arched downward any more without preventing occlusion of the jaws. The apparatus was removed and a different fixture made, which, instead of drawing downward, operated by pushing, by means of a bent screw advanced from a nut situated above the tooth, as shown in Fig. 33.

Fig. 33.

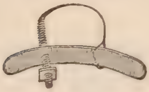


View of the second apparatus used.

This apparatus differed from the other in having no bridge or hook; instead, a plate to act as a pad, with two upright pieces extending from the skeleton plate, affording a broad surface to rest against the gum, in order to prevent injury. To this pad was soldered a smooth nut, through which passed a bent screw, the lower end of which entered the pit in the tooth, which, by means of a threaded nut, was made to advance downward.* The tooth yet requires to be rotated before the operation will be complete. This will be accomplished on the plan suggested on page 22, Fig. 6, Dental Cosmos, January, 1878.

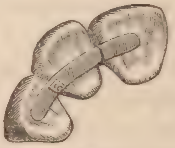
Teeth drawn from the depths of the jaw, as well as those which have been broken off and elongated, may be easily retained in place by a delicate apparatus, as shown in Fig. 34,—a gold band, one-twelfth of an inch wide, as thin as paper, and made to bind by means of a little screw and nut to a small cross-bar of plate, about one-tenth of an inch wide and of the thickness of ordinary gold plate, which should be just long enough to rest firmly in some sulcus and over the lingual plane of the adjoining teeth, as shown in Fig. 35.

Fig. 34.



Retaining apparatus.

Fig. 35.



Retaining apparatus in position.

(To be continued.)

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* Duplicate casts and apparatus of this case may be seen at the Dental Depot of S. S. White, Philadelphia.

CLINICAL REPORTS.

PHILADELPHIA DENTAL COLLEGE, DEPARTMENT OF ORAL SURGERY.

Clinical Service of Prof. J. E. Garretson, M.D.

Harelip.—The first case, gentlemen, to which I direct your attention is this of the infant lying upon the operating-table before you. As you will notice, the child has an imperfect upper lip, combined with a deforming projection of the intermaxillary bone. The imperfection of the little patient is congenital; that is, the baby was born in the condition in which we see it. Harelip, a term which well expresses the appearance of the part, gets its signification from the formation of the lip of the animal of that name, the lip of the hare being split or divided into two parts.

Harelip has not, however, always the expression of the case before us. Few surgical conditions differ more markedly. Double harelip is common; that is, the lip presents two breaks or divisions. Complicated harelip will frequently show itself to us; here the expression may be of any variety. A common condition of complicated harelip is absence of an intermaxillary bone. Another common condition is absence of a soft palate. Alveolar deficiencies, as relations, are so frequent as to be expected in all cases. Sometimes the lacking parts are to be seen hanging from the septum of the nose; sometimes they form a tumor of incongruous character and appearance lying in the labial gap. In fact, as no doubt I shall have many examples to show you during the winter, they are of every variety in expression, requiring for a proper treatment every variation on a common rule.

The child before us is three months old. I consider this age as the very best that is to be selected for the performance of an operation. At this age the plastic force is full of vigor; the child feeds at the breast of the mother, being thus in communication with the very best of infantile carminatives; dentition has not yet commenced to worry and congest neighboring parts. Three months is not, however, what is to be termed the age of selection. I have done the operation here to be practiced at all ages, from six weeks to thirty years. Some surgeons say a week old is a good time; some prefer a year old, some three years old. I will put it in a word, however, and say that you will assuredly find at the age of three months every advantage to be found at any other age.

Shall ether be given this child? Some surgeons say "not to a child so young." My experience differs from such. Only a week ago I kept a child six weeks of age under the effects of ether for nearly an hour. We will etherize this infant to complete anæsthesia, and keep it in that condition until through with the operation.

Paring for harelip is variously practiced. In the instance before us I will make one that is almost certain to avoid the ugly notch commonly seen. First dissecting away the lip from the gum to which you see it closely bound, I enter the knife nearest the nose and cut towards the free border of the part. I do not, however, cut through the border, but reaching it, the section made is allowed to fall, thus doubling the length of raw surface exposed, and giving for retention all, and much more, border tissue than can be used.* Even a happier method than the one now being practiced consists in making a lateral section from the face of one side of the lip and attaching to it a section brought from the opposite side. An objection which renders a practitioner timid about doing it is the possibility of non-union, in which case the patient is placed in a worse condition decidedly than previous to the attempt.

The pins held in my hand are made of steel, having bead heads. I use three of these, entering the first at the free border of the lip so as to be sure of a proper approximation. The second I put as near the nose as possible. The third is placed intermediate. Next, as you see, I draw gradually together the raw surfaces, using in the form of the figure eight over the pins this coarse cotton thread. The thread, as I desire you to notice, is that kind used by the grocer to tie up his small packages. Such thread, or twine, is the best that can be employed; it is very soft, thickens itself by absorbing fluids, and does not tend to strangulate the part it overlies. The pins are to be removed in from one to four days as indicated. Every case, however, is in this respect a law to itself.

We will direct that ten drops of the camphorated tincture of opium be given the child; to be repeated, if found necessary, in the evening.

Case 2 is one of aphonia. When I request the little patient to speak you observe the great volitionary effort made in response. The word will come after a time, but it is a forced word. It costs this boy as much labor to move his larynx as it does a porter to carry his load. The lad, the father tells me, commenced to lose his voice some two years back. What is the matter with him? The way to find this out is to use the laryngoscope. We must see the inside of the organ in which resides speech. Taking advantage of the opportunity I will show you how a laryngoscopic examination is made, and while showing you this will tell you about different kinds of laryngoscopes.

The glass held in my hand you will term a dentist's mirror; that is exactly what it is. The originator of laryngoscopy is M. Leuret, a French accoucheur; his idea was derived from his dentist. The little glass held in my hand is really all of the instrument that has so big a name; all other arrangements are accessories. I will not only show to myself, but will show you, the larynx of this boy, and I will use nothing in the way of an instrument but this glass. You will say illumination is required. Well, for this there is every variety of apparatus, and there is, as well, the sun.

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* A cut in the lecturer's "System of Oral Surgery," page 963, shows the method.

To-day I will use the sun. Placing the patient upon this reclining chair, having his head well thrown back, I place the open mouth, as you see, directly towards the light-rays streaming in such abundance through the skylight. Now with a napkin I catch the tongue, and drawing forward this organ, I direct the boy to speak the letter *a*. While he continues the effort to repeat this letter I introduce the glass, first warming it, carrying it gently into the fauces. I will aim first to show to the gentleman looking over my shoulder the epiglottis [the demonstration was repeated a number of times, very perfect views of the part being obtained]. I will next proceed in the search after a diagnosis. Already I have it. Let now some other members of the class come to my side and be shown what I have just seen with great clearness and satisfaction. It is a dull eye that does not catch at intervals sight of the two vocal cords lying almost motionless side by side. In the position and want of movement of these cords lies the diagnosis. The trouble with this lad is partial paralysis of the chordæ vocales. Another thing is to be observed. There is extensive granular inflammation of the mucous membrane; this, perhaps, has something to do with the lost motion in the cords. A few weeks back I operated in a case of loss of phonation where the cause lay in a large tumor which had sprung from the sacculus and filled almost completely both ventricles. To cure the case I had to perform thyrotomy, a very rarely-performed operation.

In the case of the present patient we will first prescribe for the condition of the throat, after curing this we will resort to the electric touch applied to the paralyzed cords. I have no doubt as to restoring the ability of free speech.

[In connection with the case a description was given of laryngoscopic inventions.]

Case 4 is this colored man, who comes to us from the clinic of a neighboring medical school bringing a diagnosis of abscess of antrum. Abscesses of any and of all places have associated with them signs of an inflammation that has preceded the formation of pus; acute abscess I speak of. Healthier boundaries of an antrum I have never seen than are shown in the case before us. The last thing I should have thought of in the way of disease as it relates with this man would be abscess of the antrum. To trephine an antrum, however, nowadays, using the engine, is a matter neither of trouble nor risk. I propose to trephine this antrum out of regard for the judgment of the surgeon who sends the diagnosis. It will be a point of good gained for the patient to prove that no trouble of any kind exists in the cavity. If the diagnosis made be right, it will give a lesson to us of great importance, inasmuch as it will show that local disease can exist without external manifestations. [Antrum here trephined.]

No pus comes from the wound. No pus is in the cavity. Nothing is in the cavity. I turn the probe, as you see, with ease in all directions. By exclusion the antrum falls out of all further consideration of this case.

Something, however, very serious is the matter with the man. He is so weak as scarcely to be able to stand. To look at him you would say that his affliction, whatever it may prove to be, is not without danger.

I again take in my hand the long-stemmed mirror which a few minutes back I described to you as a laryngoscope. For the purpose which I now hold it it has become a rhinoscope. The nostril adjacent to the cavity we have just opened is discharging an offensive mucus, it is swollen, it is angry-looking, it is so stopped up that no air is to be drawn through it, it is in every respect a bad-looking nostril.

I place the patient, with open mouth, before the streaming rays from the skylight, and now, as you see, introduce the glass, reversed as to its former position, into the fauces. A little skill attained in the direction enables me to get a good view of the posterior nares. The parts look much worse behind than in front. I have no hesitation in pronouncing an opinion. The trouble is inflammation of the nasal lymphatic glands, which inflammation has passed to the stage of suppuration. Beneath the Schneiderian membrane the bistoury will reveal the existence of a good deal of pus.

[A curved bistoury was here thrust into the swollen membrane, the withdrawal being followed by a free flow of pus.]

The result, gentlemen, verifies the diagnosis. That is not all, however; a more important matter remains. Why did these glands inflame? There is phthisis of a gland as there is phthisis of a lung. The disease before us is consumption of glandular structure. In these glands has been deposited tubercle of the same kind found so destructive of lung-tissue. When tubercle is deposited in glandular structure we do not speak of its expressions as consumption; we call them scrofulous. The inflammation, then, that we have here is scrofulous inflammation, and to permanently cure our patient we are to treat him for scrofulosis.

We order first daily attention to the local disease. Second, and most important, we direct free exercise in the open air conjoined with salt baths, to be taken each morning. The character of diet is important; the patient must live well. Rest is a necessity; the man must be in bed every night by nine o'clock. As medicines are concerned, we will put him at once on cod-liver oil and the phosphites. To lift him quickly as possible from his present state of depression we will prescribe pills of sulphate of quinia, three grains each; one to be taken thrice daily. For a few days it will be well for him to drink reasonably of eggnog.

PROCEEDINGS OF DENTAL SOCIETIES.

AMERICAN DENTAL ASSOCIATION.—EIGHTEENTH ANNUAL MEETING.

THIRD DAY—*Morning Session.*

THE usual routine business having been disposed of, the subject of Dental Education was taken up, and a report was read by Dr. George J. Friedrichs, of New Orleans. He claimed that in these days private tuition was not sufficient to make qualified dentists; that a college education was demanded alike by the public and the profession. A medical course should be the foundation, and should be followed by instruction from those who are in active practice of dentistry as a specialty. He thought there was still room for improvement in the infirmaries of dental colleges. The main thing in the practice of dentistry, in the estimation of the author, was filling teeth, and he who not being competent undertook to perform that operation was worse than a thief, adding injury to theft, inflicting unnecessary pain, and taking his patient's time and money on false pretenses. The report recommended that the president of the association be authorized to appoint a committee of one at every place where a college is located, to report to the association the advantages possessed by such institution for the practical teachings of dentistry.

Dr. Thomas Fillebrown, of Portland, Maine, then read a report on education. He took the ground that dentistry is best taught in regular medical colleges; and in support of this argued that more schools are needed to afford the requisite facilities. He took the ground that where professional schools are located there is found a higher standard of professional excellence. He would abolish the degree of D.D.S., and have both dental and medical graduates receive the M.D.; then if a young man made a mistake in his choice he could easily correct it. A poor doctor might make a good dentist, and *vice versa.* When dentists know as much about medicine, and medical men as much about dentistry as they should, no question about recognition will be raised, for there will be but one family, with one Alma Mater, and one common object,—the amelioration of human suffering. In conclusion, Dr. Fillebrown offered the following resolutions, which he desired to have voted upon after the discussion of this subject:

Whereas, Dentistry is a specialty of medicine, and requires, as do other specialties, a thorough medical education as preliminary to its most successful study and practice;

Resolved, That we deem it expedient and for the best interests of the practice of dentistry that existing medical schools so enlarge their curriculum as to include efficient instruction in dentistry, and thus make the requirements for graduation the same for this as for other specialties of medicine.

Another report on the same subject was then read by Dr. Crouse, of Chicago, of which we give an abstract, as follows:

The report stated that we must look to the colleges for reforms in dental education, and there should be concert of action on the vital points in their management. Certain regulations should be adopted by all the schools; a thorough preliminary education should be insisted upon; a student should not be permitted to enter a college without having been under a preceptor for two years. Three courses of eight months each should be required. There are too many colleges in existence; at last reports there were twelve; since then there have been two births and no deaths. The report then reviewed the two new colleges, the Western College of Dental Surgeons, and the Dental Department of the University of Pennsylvania. In regard to the first, it was claimed that it would be an advance to have the faculty consist entirely of practicing dentists, and also to allow graduation without attending lectures. The writer failed to see how the former was any material advance over the present mixed faculties; the teaching of anatomy and chemistry should be by those best qualified in those branches, and such were more likely to be medical men than dentists. In regard to the proposition to grant diplomas without attendance on lectures, the writer considered that it should only be done when the candidate is fully qualified, and only by a board having the confidence of the profession. The practice of granting State degrees or diplomas was deprecated.

The University of Pennsylvania was spoken of as in some respects offering cause for congratulation. Some features of it, however, might prevent it from being recognized as the advance step anticipated. Medical men, and those outside of our ranks, will take little interest in the amount of education which we have. The disposition to add dental chairs to medical colleges is gratifying in itself, but we must work out our own salvation.

An increase in the number of dental schools is not desirable. The degrees conferred by colleges should be uniform; that of D.D.S., as the oldest, should have precedence. Increased attention is being paid to clinics in several of the schools, which will result in good. Several have also increased the length of their courses. But the dental student should first be medically educated; after he has acquired the title of M.D., then his *special* education should begin, just as with other specialists. This is the higher education which should be fostered, but advancements, like individuals, grow, and are not made.

These reports being open for discussion,

Dr. Hunt, of Washington, said that the main objection to the plan proposed by Dr. Fillebrown was, that it would put the education of dentists outside of the control of the dental profession. Medical education is necessary, but it is a part of the course of instruction in dental colleges. The success of any institution depended not on the adoption of rules and regulations, but on the conscientious discharge of the duties and responsibilities resting upon the officers; and the manner in which this was done determined the character of the institution. The question of whether dentistry is a distinct profession or not does not enter into the question of dental education.

Dr. Ingersoll, of Keokuk, Iowa. What sort of a degree would you give the medical student? Shall it be the same as for the dentist?

Dr. Fillebrown. Dentistry is on the same footing as other specialties; there should be the same preliminary education and a post-graduate course. In theory medical men should be educated in dentistry, just as they are in ophthalmology, though they may never perform operations in either. The ability to make fine operations comes only from long practice, but the pathology and therapeutics of dentistry should be understood by medically-educated men. All graduates should pass the same examinations without question as to what they intended to practice.

Dr. Ingersoll. Of late years the tendency in all professions has been downward rather than upward. In this effort we are beginning in the middle. It is mental training that is wanted; it is not so much a medical education that we need as it is an elementary one. There is too much made of the medical and too little of the preliminary training. There are plenty of young men who start out to study medicine without being able to write three lines of correct English. On the other hand he had known well-instructed men refused graduation because they had not been studying five years instead of four. Unless students are men of general education and intelligence, they cannot even comprehend the meaning of terms. We must begin at the beginning before we can elevate.

Dr. James Taylor, of Cincinnati, said that the debate led him back thirty years, to the time of Harris, when there were no medical colleges that would receive us. They said they had already too much to do; they could not in two terms educate men for both medicine and dentistry. There was no course open but the establishment of dental schools, and they had been established. We should not care for medical recognition, but we should be ready for the intelligent practice of our own specialty. The speaker and Dr. Harris had studied medicine and practiced dentistry, and encouraged the organization of dental colleges. It now appears as if the profession were not satisfied with them. Dental colleges teach the medical branches, and the graduates average as well as medical graduates. The curriculum of dental schools should be enlarged as fast as demanded, and if demanded it will be done. Had dental education been left in medical hands forty years ago, where would we have been to-day? We never could have been where we are. Let us go on and elevate our profession, by increasing our knowledge of it regardless of recognition.

Dr. John Allen, of New York, said it did him good to hear these discussions, and they show progress. The time was when there was no such means as now for education. Medical education is a good foundation, but does not qualify for dental practice. There are many cases which a dentist without medical knowledge could not diagnose. Medical men should also understand more of the principles of dentistry.

Dr. Wetherbee, of Boston. The curse of the dental profession is that there are too many men in it who are not dentally educated. He had taken pleasure in favoring *dental* education. It seems that after a trial of forty years there are some who are in favor of a dental education in medical colleges. There are many efficient and able dentists in the United States who have never studied medicine.

Professor Darby, of the University of Pennsylvania. One paper recommends that there be fewer dental schools; another that there be more. We might discuss this for hours and not decide it. Waiving anything that had been said uncomplimentary to the institution which he represented, he would say that its motives were not understood. The question had arisen as to the degree,—whether it should be D.D.S. or M.D. Should the dental student take a three years' course and have a full degree, or should it be optional? The latter had been decided upon, and most of the matriculates thus far had signified their intention to take the full degree. Time will prove whether the profession is ready for a medical education; we shall see how many will take a three years' course. How many are financially prepared? Under the programme that had been laid down, it would take ten years to be ready for anything. He regrets that it should have been hinted that gain was an object with the University of Pennsylvania. Fifty-five thousand dollars had been spent for a building, and a large amount of money to fit it up; it was not with the object of gain.

Dr. Atkinson. We have our likes and dislikes, but we want to get at the truth. Dentistry is medicine; this defies successful controversy. It is for us to decide where we shall get the highest light and most sharply defined. In starting alone we have worked together, and better than we knew. How shall we utilize what is good in medical teaching? By the microscope and the chemical retort. We have the material among us. He (the speaker) would first make men A.B., then M.D., and then dentists.

Dr. Spalding, of St. Louis, said that the Western College of Dental Surgeons had made it possible to graduate without lectures, because there are many worthy men who have no degrees, and to them other doors are closed. The object was to universalize degrees among dentists, as among medical men. The question is not as to the abstract fact of dentistry being a branch of medicine. Nobody doubts that. We must, however, take facts as they are, and not go too fast. We cannot reach the desired end at a bound. We must not drive men away, so that they will begin practice after a short tuition, which they are doing to-day. The question is, what is practicable? rather than, what we desire. The consequences of incorporation of dentistry into medicine would be to sink and retard dentistry. Dental colleges are even now more particular than medical colleges about previous education. Dental graduates average higher than medical. He has been connected with both dental and medical schools, and given special attention to the subject. The result of the proposed action would be to swallow up dentistry, its schools, societies, etc. We are too large for that. We want more unanimity of opinion on this subject.

Dr. McQuillen. The arguments presented in favor of a thorough medical education on the part of dental students are very plausible. The question is whether the system proposed is practicable or not for the mass of students, and will prepare them for the *practice* of dentistry. One of the gentlemen said, "It is a pity dental colleges were established, and now stand in the way of dental departments in connection with medical colleges." No one familiar with the history of dental education would have made such a remark. Many years ago, before dental colleges were thought of, overtures were made to the medical colleges by leading members of the dental profession to enlarge the curriculum of study, so as to embrace at least two chairs, to be devoted to teaching dentistry, and a most excellent paper was published at that time by Dr. E. B. Gardette, of Philadelphia, but the trustees and faculties opposed the innovation, and the dental colleges came into existence as a *necessity.* Subsequent to this a resolution was adopted by the American Medical Association (in 1852), "That colleges of dentistry are not recognized by this association as among the bodies authorized to send delegates to its meetings," notwithstanding the fact that the delegates who presented these credentials were men of culture, leading positions, and *regular graduates of reputable medical colleges.* Thus denied an opportunity for education in the medical colleges, and the recognition of medically-educated delegates from the faculties of dental colleges by the National Medical Association, there was but one course open for the education of those who desired to enter the ranks of the profession, and that was in the dental colleges. This work has been done in a manner that commands the respect of thoughtful men at home and abroad, and attracts students from every quarter of the globe to our dental colleges. Many of these are medical graduates of the universities of Europe, and they reverse the course pursued by the young medical graduates of America, who go to Europe to complete their education in the universities from which our students come.

At the Centennial Exhibition it was admitted without question by foreign judges and visitors that the American machinery exhibited far surpassed everything presented from abroad. This was due to the fact that in developing the resources of a new country our necessities have made an unceasing demand upon the ingenuity of the people, and have induced large numbers of men with acute intellects to devote their attention to inventing new and improving old machinery. The same influences have given to American dentistry the advanced position it occupies in the estimation of the world. There is a general impression that the teeth are worse here than in Europe. Whether that is so or not is a matter of question, but there is no doubt of the fact that from the highest to the lowest there is a more general recognition of the value of the teeth, and a greater care and interest felt in their preservation here than elsewhere. This has given occupation to, and developed the skill and stimulated the inventive faculties of, many active minds engaged in the preservation of the natural organs and the construction of artificial substitutes. After many long years of hard work, self-sacrifice, and anxious waiting on the part of those engaged in the struggle, a certain measure of success has attended the dental colleges, and this having attracted the attention of the trustees and faculties of the medical colleges, some have decided to grant the boon denied before, and establish chairs from which dentistry may be taught. Is this due to a more lively interest in the welfare and advancement of our profession? If so, it comes after a very long probation, with the work done by other hands. Whatever the motives or objects may be, the important and vital question to the profession and dental students is, Will *better* opportunities be presented there than in the dental colleges for engaging in the *practice* of dentistry? This the future must determine. To be consistent and prove really in earnest, however, institutions that advocate a higher standard of education, and demand of medical students three years of study and attendance upon three winter courses of lectures, should require the same of dental students, as Harvard Dental School does.

Dr. Ingersoll said he was for independency because we have risen by it. Technically we are medical specialists, but not popularly. There is nothing in the medical books or curriculums on which to base dental practice. A medical graduate is not qualified to practice dentistry.

The question was then taken on the adoption of Dr. Fillebrown's resolution, and it was lost by a vote of nineteen to twenty-eight, not half the members voting.

Dr. Crouse. The medical schools are in as bad a fix as ours are: there are too many of them and too much competition. They want to add dental chairs for the sake of a large class. We in Chicago are fighting against dental colleges started by medical men. In Iowa they want to establish another. The degree M.D.S. granted by the State of New York is bad, and should be abandoned.

The subject was then passed, and the association adjourned.

Afternoon Session.

This was a special or extra session held for the purpose of attending to some matters of business, including a consideration of the certificates of membership which the corresponding secretary had caused to be engraved and printed, as noted in the report of the first day's proceedings.

After considerable discussion, on motion of Dr. Crouse, the whole matter was laid on the table.

It was then voted that the committee's bill should be paid, and that the plate should remain in the custody of the recording secretary.

A committee of three to prepare resolutions on the death of Prof. Barker was ordered.

After some minor business the association adjourned.

Evening Session.

This was held merely for the selection of place of next meeting and election of officers, the results of which have been already given.

ODONTOGRAPHIC SOCIETY OF PENNSYLVANIA.

REPORTED BY L. ASHLEY FAUGHT, D.D.S.

A MEETING of the Odontographic Society was held on Wednesday evening, September 18th, 1878, at eight o'clock, in the Philadelphia Dental College. The president, Dr. M. Lukens Long, in the chair. After the transaction of the usual business of the society, the subject for the evening, "Re- and Transplantation of Teeth," was introduced and discussed.

Professor James E. Garretson regarded the operation a purely surgical one, but considered the extraction of a tooth for the purpose of filling, and then replacing it, as objectionable. He would refrain from performing it upon the ground that it was somewhat dangerous, and was only a conservative, and not a necessary operation. He had had an occasion once to replace a tooth which had been extracted by another operator through mistake. It had been out of the mouth a few hours. There was considerable rebellion on the part of nature, showing itself in inflammation. He conquered this, however. The tooth had now been in position about seven years, and looks well, excepting a little discoloration. He thought a consideration of each individual case very important. What would be safe with one would not be safe with another. He thought that pyæmia might be produced by the operation. It was to be feared.

Professor Stellwagen. By replantation is meant the extraction and replacing of the same tooth in the same mouth, and in the same position; by transplantation is meant the extraction and replacing of a tooth in a different portion of the same mouth, or the taking of a tooth from one mouth and placing it in another. He thought there was of course some danger of conveying disease, but this must be guarded against. He had performed the operation quite a number of times, with but one failure. Too severely forcing the tooth into the socket should be avoided, as fracture of the alveolar process might be produced. The inflammation that sets in must be combated, and if he did not succeed in getting it under control in one or two attempts, he generally extracted the tooth and abandoned the operation. This applies more to replantation than to transplantation. He always cut off a small portion of the apex of the root to prevent impingement upon the end of the nerve in replacing the tooth. If the root was blunt he cut off only a small portion, but if it was sharp he cut off more, and rounded the edges after cutting off the end, so that in forcing the tooth into place he might not tear the lining of the alveolus. He always polished the end of the root, and liked to insert a gold screw into a hole drilled into the end of the tooth. He did not bathe his teeth in carbolic acid, as he preferred to have the relations as natural as possible. He did not think there was much danger of producing septic poisoning. He recognized the danger of tetanus, but considered the cutting off of the root above referred to as a preventive.

Prof. McQuillen would have preferred not to express an opinion on the subject, but as it was insisted upon that he should, would say he had never performed the operation. At the same time he recognized that the success attendant upon the cases reported by Prof. Stellwagen apparently justified the operation. In deciding this question, not for others but for himself, the unfortunate experience of Prof. Barker in the replantation of teeth for a patient in which tetanus followed so closely upon the operation that there could be no question of its being the exciting cause, and the subsequent death of the patient, attributed by the family and friends to the shock to the system, would deter him from performing an operation not of *necessity*, but of *choice*. The sad result attending the case made such a profound impression upon Prof. Barker that he never attempted it again, and up to the day of his death opposed the practice on the part of others. In addition to this, an operator renders himself liable to an action for malpractice in the event of an unfortunate result following such an operation, and, although prominent professional men might testify in favor of the operator and the operation, a jury would more than likely give a verdict against him, as one did in the case of an experienced and skillful practitioner in the northern part of the State, who had heavy damages claimed by a patient on account of the slipping of an instrument, notwithstanding the fact that a number of leading professional men testified that it was an accident which might have happened in the hands of the most careful operators.

Prof. Stellwagen did not think the case of Prof. Barker had been correctly stated. In his recollection of it the connection between the replantation and the subsequent tetanus had not been clearly proved. Even if it had, there was not an operation in surgery, from the slightest to the greatest, that might not be objected to on account of the possibility of tetanus following it. The merest scratch may cause it.

Prof. Garretson said the operation was justifiable on the general principles of surgery. Years ago Prof. Atlee had been denounced in unmeasured terms by eminent surgeons as a murderer for performing ovariotomy, but the success attending the many operations made by him during the past twenty-five years turned the tide in his favor, and he had the gratification of knowing before his death that he was recognized all over the world by surgeons as a benefactor of his race on account of what he had done in that direction. The same thing was true of replantation and transplantation.

Prof. McQuillen had derived his impression of the relation between the replantation and the tetanus from Prof. Barker and the opinion expressed by Prof. S. D. Gross, one of the attending surgeons. He could not recognize, even upon general principles, the connection between ovariotomy and transplantation. The first was an operation of *necessity*, in which life itself might be at stake, or at least unendurable if not performed. This justified the operation. Transplantation, on the contrary, was one of *choice*.

Dr. Dixon had performed the operation several times with some success, but did not cut off the roots.

Adjourned.

AMERICAN DENTAL CONVENTION.

The American Dental Convention held its twenty-fourth annual session at the Cataract House, Niagara Falls, August 7th, 1878. Dr. J. Taft, of Cincinnati, president, in the chair. The secretary being absent, Dr. J. G. Ambler was elected secretary *pro tem.*

The executive committee reported that as the American Dental Association was in session, it was inexpedient to hold a separate meeting, except so far as the ordinary business of the convention was concerned. Therefore, no expenses having been incurred, no assessment upon the members was necessary.

The following officers were elected for the ensuing year:

President.—C. A. Marvin, of Brooklyn.

Vice-President.—R. F. Hunt, of Washington.

Treasurer.—J. G. Ambler, of New York.

Recording Secretary.—Ambler Tees, of Philadelphia.

On motion, adjourned to meet in Saratoga the second Tuesday in August, 1879.

J. G. Ambler, *Secretary pro tem.*

GEORGIA STATE DENTAL SOCIETY.

The tenth annual session of the Georgia State Dental Society was held in the city of Atlanta, commencing on the 29th of July, 1878. The president, Dr. M. H. Thomas, in the chair. The State Board of Dental Examiners met at the same time and place, and accomplished a very effective work for the good of the profession throughout the State.

After an unusually interesting session of three days the society elected the following officers for the ensuing year, and adjourned to the second Monday in July, 1879, at Augusta, Georgia:

President.—Dr. W. C. Wardlaw, Augusta.

First Vice-President.—Dr. M. S. Jobson, Perry.

Second Vice-President.—Dr. J. A. Chapple, La Grange.

Corresponding Secretary.—Dr. L. D. Carpenter, Atlanta.

Recording Secretary.—Dr. R. A. Holliday, Atlanta.

Treasurer.—Dr. H. A. Lowrance, Athens.

Committee of Arrangements.—Drs. George Paterson, Waynesboro'; G. H. Winkler, Augusta; Samuel Hape, Atlanta.

L. D. Carpenter, *Corresponding Secretary.*

EAST TENNESSEE DENTAL ASSOCIATION.

The eleventh annual meeting of the East Tennessee Dental Association was held at Sweetwater, Tennessee, on the 18th of September, and continued in session three days.

The following officers were elected for the ensuing year:

President.—Dr. Thomas J. Speck, Morristown.

Vice-President.—Dr. W. C. Carson, Cleveland.

Recording Secretary and Treasurer.—Dr. A. W. Palmer, Kingston.

Corresponding Secretary.—Dr. J. B. Williams, Maryville.

The meeting was the largest and most interesting ever held. The association adjourned to meet in Morristown, Tennessee, the first Tuesday in August, 1879.

A. W. Palmer, *Secretary.*

MERRIMACK VALLEY DENTAL ASSOCIATION.

The sixteenth annual meeting of the Merrimack Valley Dental Association will be held at the American House, Lowell, Mass., Thursday and Friday, November 7th and 8th, 1878, commencing at 11 A.M., on Thursday. Subject for discussion, "Plastic Fillings." All respectable members of the dental profession are invited to be present and join the association.

W. E. Riggs, *Secretary.*

LEBANON VALLEY DENTAL ASSOCIATION.

The semi-annual meeting of the Lebanon Valley Dental Association will be held at the Mansion House, Reading, Pa., on Tuesday, November 19th, 1878, commencing at 10 A.M. Session two days.

Essays will be read by members of the association.

Assigned subjects for discussion, "Mechanical Dentistry," and "Root Filling."

All are welcome.

P. K. Filbert, *Corresponding Secretary.*

PERISCOPE.

Pathological Dentition.—. . . Purely normal dentition depends upon an absolute accord between the processes of growth and absorption, as well of the crypt as of the mucous membrane covering the tooth. When from any cause there is a want of such accordance, the propulsive and resistive forces are in antagonism, and irritation is the result. In normal dentition the absorption of the overlying tissues is effected without the production of irritation; but an increased pressure arrests the absorptive action, and produces congestion, tumefaction, induration, and ulceration. When the advance of the tooth is more rapid than is the removal by absorption of the superimposed tissues, the latter act as a mechanical obstacle, and the tooth becomes, in turn, a mechanical irritant. The result is usually what might, *à priori*, be expected,—the gums give external indications of abnormal condition. Under such circumstances it is rational, and in accord with analogy, to expect benefit by relief of capillary distention following the use of the lancet.

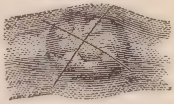
But the direct pressure of the advancing tooth upon the fibrous integuments is not the only, nor the principal, factor in the production of disturbance of equilibrium occurring in pathological dentition. The most serious complications are—it is reasonable to suppose—caused by the backward pressure of the resisting gums upon the nervous and vascular supply of the pulp, giving rise to exquisite and unremitting pain, and to a consequent irritability of the general system, which finds expression in sleeplessness, thirst, fever, nausea, diarrhœa, convulsions, paralysis, and other serious lesions, many of which, as strabismus or epilepsy, remain throughout life.

That this backward pressure is the occasion of the constitutional disturbance so often seen in teething children is demonstrated, negatively by the inefficiency of hygienic measures and of general medication; by failure to procure relief by *scoring* the gums (a practice which has brought the lancet into undeserved disrepute), and positively by the immediate, apparently almost magical, improvement which follows the removal of the cause, viz., the pressure of the fibrous tissue upon the advancing tooth. It is not, therefore, a sufficient reason for not lancing the gums that they exhibit neither tumefaction, redness, induration, nor the whiteness of the presenting tooth, though some external local manifestation is usually present. In the presence of symptoms occurring during the period of dentition for which there is found no obvious explanation, it is surely the part of wisdom to give the child the benefit of the doubt, by free incisions over the teeth whose eruption is, in accordance with general laws, to be anticipated, even though there be no hyperæmia of the gums, or other local indication, especially as the operation causes only a trifling amount of pain, inflicts no injury, and is practically free from danger. Local indications *demand* the lancet; constitutional symptoms of distress, not otherwise accounted for, suggest and justify it.

. . . The operation of lancing the gums should, when necessary, be performed in the spirit of the adage, "what is worth doing at all is worth doing well." The operator should be seated directly in front of the assistant, the knees of the two parties corresponding in height. Some direct the child to be held crosswise on the lap of the assistant; others prefer to be behind the head of the child to operate on the left side, and in front to operate on the right side of either jaw; others take the head on their knees when operating on the upper jaw, and place the head on the knees of the assistant for operations on the lower jaw. In any case, the child should be held with such relation to the window or to the artificial light that the parts to be operated upon may be illuminated to the best advantage. The instrument employed should be a curved double-edged bistoury, so protected by wrapping the blade as to avoid injury to the tongue, lips, or cheek. The left hand of the operator should separate the jaws and protect the tongue and lips of the child in such manner that any unexpected movement may result in injury to his own fingers rather than to the child. In the case of a child disposed to struggle, the insertion of a small cork between the jaws will be of service. This can be held in position by the assistant.

The manner in which this trifling operation is performed has much to do with its success or failure. As has been already stated, the object is not merely nor chiefly to induce a flow of blood, but to remove tension. The cuts should, therefore, be made with special reference to the form of the presenting tooth. The incisors and cuspids need only a division of the gum in the line of the arch. The molars require a crucial incision, × thus,—at once easier of performance and more effective than a right-angular division,—the center of the crown, as near as can be determined, indicating the point of decussation. The cuts should, of course, be sufficiently deep to reach the presenting surface, and extend fully up to and a little beyond its boundaries, so as to insure the entire liberation of the tooth. (Fig. 1.) Only an *undue* force will be likely to injure the incompletely solidified enamel of the erupting tooth, or endanger the germs of the developing permanent teeth. It is well always to direct the lance towards the labial instead of the lingual surface of the jaw in lancing over the front teeth, as there is thus less liability to injure the crypts of the permanent teeth, if from any cause the cut should be made deeper than is intended.

Fig. 1.



Partial eruption of a tooth is frequently accepted as a solution of the problem,—the slightest presentation being considered as definitely deciding against the necessity for lancing. This is generally true in the case of the incisors; far from true of the cuspids and molars. The cone shape of the cuspids insures a persistence of the trouble from pressure of the inclosing ring until fully erupted, as will be seen by reference to Fig. 2. A complete severance of this fibrous ring (on the anterior and posterior as well as lateral surfaces) is indicated, as in Fig. 3, and is even more necessary than before its partial eruption. A cuspid is, indeed, rarely the cause of irritation until after the erup-

Fig. 2.

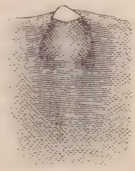
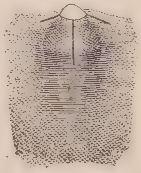


Fig. 3.



tion of its point. All the cusps of a molar may have erupted, and yet strong bands of fibrous integument maintain a resistance as decided as before their appearance, as in Fig. 4. In this case either the boundaries of the tooth should be traced by the lancet, and all such bands surely severed around its outlines, or a crucial incision, as in Fig. 5, should be made, so as to insure perfect release from pressure. If the wound should heal readily, and the symptoms point to a renewal of the irritation, an early repetition of the operation will be advisable, and it may be repeated with advantage at short intervals until the tooth has completely erupted. In extreme or urgent cases it is sometimes advisable to seize the gum over a presenting molar with a tenaculum, and cut out a square block of gum, so as fully to expose the whole articulating surface of the tooth.

Fig. 4.

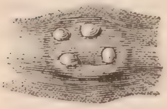
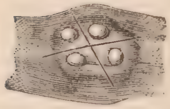


Fig. 5.



Persistent bleeding after lancing, though an infrequent incident, has occurred, and is probably, at least sometimes, due to a sucking of the gums by the child, which is stimulated thereto by the taste of the blood. In such case the substitution of the nipple of the nurse will give the child better employment. The extent of the hemorrhage can be ascertained by touching the wound occasionally with the napkin-covered finger. If it continues longer than seems desirable, a little very finely-powdered alum rubbed into the cuts will almost surely control it. If this fail, the case is to be further treated on general principles. . . . —*Extracted from a paper by J. W. White, M.D., in the American Supplement to the Obstetrical Journal of Great Britain and Ireland.*

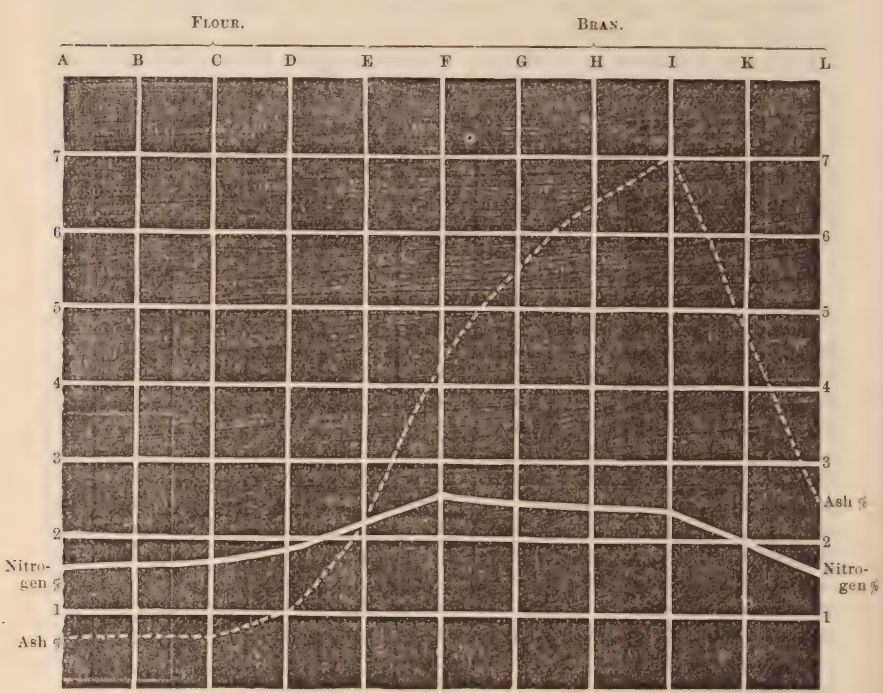
Real Brown Bread.—Notwithstanding the labors of chemist and physiologist, the exact composition and nutritive value of the several products obtained in milling wheat have not been thoroughly determined. That fine flour contains less nitrogen, and leaves, when burnt, less ash than biscuit flour, middlings, or any variety of bran, is well known. The percentages of starch, of the mixture of cellulose and lignose known as "fiber," and of fat, in several series of samples of mill-products, have been ascertained. Moreover, there have been made many minute analyses of the ash of wheat and of the preparations derived from it. But we are still somewhat in the dark concerning both the chemical and physiological aspects of what may justly be regarded as the central feature of the problem under discussion. For we are not sure of the nature of the nitrogen compounds which exist in the several distinct parts of the grain of wheat; nor do we know how far the phosphates and such nitrogen compounds as may be ranked with the true albuminoids can be digested when intimately associated with fiber. Then, too, the mechanical condition of these coarser products from the milling of wheat is of considerable moment in estimating their actual value as nutrients.

Before endeavoring to reach some conclusion as to the comparative merits of white bread, brown bread, and whole-meal bread, I will offer in as compact a form as possible the more important and incontrovertible data which must form the starting-point of the discussion.

Firstly, as to variations in composition in the grain itself. These variations, chiefly affecting the percentage of nitrogen, depend upon hereditary qualities in different strains of the wheat-plant; upon climate and season; and, to some extent, but not so largely as is often stated, upon cultivation, soil, and manure. The hard translucent wheats, *blés durs et glacés*, of high specific gravity, about 1.41, and, owing to their lengthened and wrinkled shape, of low weight per bushel,—these wheats are rich in nitrogen. The soft opaque wheats, of less specific gravity, about 1.38, and, owing to their rounded and plump form, of high weight per bushel,—these are poor in nitrogen. The hard wheats grown in Poland, in Southern Russia, in Italy, and in Auvergne, are used in the manufacture of macaroni, vermicelli, semolina, and *pâtes d'Italie.* The softer and more starchy wheats are especially appropriate for the production of fine white flour. According to the most recent analyses, the percentage of nitrogen in different varieties and samples of air-dry wheat may range from 1.3 up to 2.5,—numbers corresponding to 8.23 and 15.83, respectively, of gluten or flesh-forming substances. But the same variety of wheat may give a grain having 3 per cent. more gluten in a bad season than when matured in a fine summer. More than this, one may select from the same field, the same plant, or even the same ear, individual grains which shall show quite as wide a variation in gluten as that just cited. For instance, a sample of Hallett's white rough-chaffed wheat of the harvest of 1865 contained many dense and translucent horny grains having 13.2 per cent. of gluten, while the white opaque soft grains from the same sample contained but 9.6 per cent.

It will simplify the consideration of the chemistry of mill-products if we confine our attention mainly to the nitrogen and ash of the grain. The following diagram represents the percentages of these two substances in a series of flours and brands derived from a good sample of English soft wheat. The figures are based in great measure upon the analyses made at Rothamsted by Dr. Gilbert. The mill-products termed A, B, C, are derived mainly from the central portion of the grain, and constitute "fine flour"; D is a biscuit flour known as "tailings"; E is intermediate between flour and bran, and goes under the name of "middlings"; F is "coarse sharps"; G, "fine pollard"; H, "coarse pollard"; and I, "long bran." K, or thin bran, is a product obtained in the process of decorticating wheat by attrition; while L is separated from the grain by moistening and then rubbing it, as is the method devised by Mège Mouriés. These two latter products may legitimately find a place in the series, since they represent the last terms as we proceed towards the outer coats of the grain.

The accompanying table explains itself; we would remark merely that both nitrogen and ash are lowest in the four flours, and that the former constituent attains its maximum in F, the coarse sharps, and the latter in I, the long bran. In K and L both nitrogen and ash are lower, these products containing much cellulose, made up as they are in great measure of the three coats which form the pericarp of the grain. But it must not be forgotten that all the mill-products included under "bran" contain much more cellulose than is present in flour, namely, from 7 to 15 per cent., or even more, in lieu of 1 per cent., or less. And it would appear that while flour contains more than 90 per cent. of its nitrogen in the form of true albuminoids or flesh-formers, in some of the brans one-third of their nitrogen is in the form of non-albuminous bodies, of no recognized value as nutrients.



We have now to secure but one more datum before we proceed to the determination of the main question before us. How much flour and how much bran will 100 parts of ordinary soft wheat yield on the ordinary system of low-milling adopted in England? As the averages from an immense number of independent estimates we may put down the flour at a total of 80, the bran at 17, and the loss at 3. Thus, from an economical point of view, we appear to lose $\frac{1}{5}$, or 20 per cent., of our wheat by submitting it to the numerous treatments involved in the manufacture of flour. But is this really the case? We think not. For much of the nitrogen in the rejected parts is not in the form of flesh-forming matter, and much that does so exist in the bran passes unaltered and unused through the alimentary canal, because of its close incorporation with fiber. But on the other side we must not forget that bone-forming materials are clearly deficient in wheaten flour, and that those phosphatic compounds present in bran are readily soluble to a large extent, not only in the several digestive secretions with which they come in contact in the body, but also in pure water.

But, in comparing and contrasting bread made from flour with that made from whole wheat, we must consider other points. We shall find it impossible to make, by means of leaven or yeast, a light spongy loaf from whole wheat finely ground, the so-called *cerealin* of the bran inducing chemical changes which result in a moist, clammy, dense product. Even whole wheat merely crushed into meal, and not ground, partakes of the same defect. Fine flour, on the other hand, yields a bread which is light enough before mastication, but which, when masticated, possesses a marked tendency to become compacted into dense lumps which may never become penetrated by the gastric and intestinal juices, and which are a frequent cause of constipation. Whole-meal bread cannot be charged with this defect; indeed it acts medicinally as a laxative, and by reason of its mechanical texture is hurried rather too quickly along the digestive tract, so that the full virtue of such of its nutrients as are really soluble becomes in part lost. Yet there is no doubt that for many persons, especially those who have passed middle age and are engaged in sedentary occupations, whole wheaten meal in the form of bread, biscuits, scones, etc., forms an invaluable diet.

The following analyses may present some of the foregoing statements in a clearer light and may add some additional particulars of interest. They represent, so far as a couple of sets of average results can do so, the percentage composition of ordinary white bread and of the whole-meal bread made by Messrs. Hill & Son:

	White.	Whole Meal.
Water	40.0	43.5
Albuminoids or flesh-formers*	7.0	10.5†
Starch, dextrin, and sugar	50.7	40.6
Oil and fat	0.6	1.6
Cellulose and lignose	0.5	1.8
Ash or mineral matter‡	1.2	2.0

It is clear from the above figures that if we could reckon the whole of the nitrogenous matter in whole meal bread as equally effective with that contained in white bread, we should possess in the former a far more perfectly adjusted food; for the ratio of flesh-formers to heat-givers is about 1 to 7½ in white bread, while it approaches 1 to 4 in some samples, at least, of whole-meal bread. Add to this the higher proportion of phosphates in the latter, and its *chemical* superiority over white bread becomes still more marked: its flavor, too, is far richer.

One word as to ordinary brown bread will suffice. It is a poor preparation at the best. By adding a dash of rather rough bran to flour we do not obtain a satisfactory or rich product: analysis demonstrates this fact clearly.

We cannot leave this subject without referring to the little pamphlet which Messrs. Hill & Son have recently issued,§ on the subject of wheaten meal. Though its main purpose is necessarily a commercial one, it presents many interesting and important facts in a readable form. Messrs. Hill have certainly brought their specialty in bread-making some way on the road to perfection. With a few of the opinions in their little *brochure* we cannot, however, wholly concur; nor do we see how their assertion can be maintained that the present system of white bread making involves the loss of 50 to 60 per cent. of the wheat devoted to that purpose.

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* Calculated from total nitrogen present.

† As much as 12.5 in some samples.

‡ Includes common salt added.

§ "The Whole-Meal Bread Question." By W. Hill and Son, Bishops-gate Street.

The limited space at our command must be our excuse for the very imperfect treatment here adopted of the wide subject before us.—*A. H. Church, in Nature.*

STAMMERING.—A pamphlet, "Du Bégaiement et de son Traitement Physiologique," by Dr. Jules Godard, although ostensibly written to bring into notice the method of treatment employed by a certain Professor Chervin, contains matter of some interest touching upon the medical history of this very common nervous trouble. It appears that Dupuytren was accustomed to recommend stammerers to adopt a method of speaking more like an operatic recitative than ordinary conversation. Itard, a French physician, devised a metal fork to be worn under the tongue. Rollier adopted the theory, highly satisfactory to the stammerers themselves, that their trouble was due merely to the fact that their vivid imaginations went too fast for the machinery which was to give utterance to their ideas. According to McCormac, the chief cause of stammering was the attempt to phonate with empty lungs, and the cure consisted in causing a deep inspiration to precede the act of speaking. Serres considered that to the respiratory trouble there was added the choreic inco-ordination of the muscles of articulation. Colombat adopted an elaborate classification of stammerers. Thus he divided them into two chief classes,—(*a*) the labio-choreic and (*b*) the gutturo-tetanic. The labio-choreic admitted of four sub-classes,—viz., (1) deforming, grimacial, (2) aphonic (of women), (3) loquacious with spluttering, and (4) lingual with lisping. The gutturo-tetanic admitted six sub-classes,—thus: (1) dumb; (2) intermittent; (3) choreiform; (4) canine, in which the sound emitted resembles barking; (5) epileptiform, with excess of limb-movement; and (6) idiotic. Hervey thought he saw the cause of stammering in the tongue being too short for the mouth, or the frænum too rigid. His treatment consisted in snipping the frænum or in wearing a metallic arc inside the lower dental arch, so that the tip of the tongue might be brought in contact therewith. Dieffenbach adopted the heroic measure of dividing certain of the muscles going to form the root of the tongue, and Velpeau, following in the same direction, had recourse to the division of certain muscles, and Amussat also advocated similar severe surgical measures.

The classification adopted by Godard and Chervin is as follows: 1, inspiratory stammering; 2, expiratory stammering; and 3, mixed stammering; and each of these three classes is divided into a grimacial and a non-grimacial sub-class. The method of treatment adopted by Chervin is such as common sense dictates, and such as has been in ordinary use in this country. It consists in a systematic drilling of the muscles used in phonation and articulation, the pupil being made merely to imitate the movements of the master. The simple movements of respiration are first practiced rhythmically and systematically, and if the patient be a very bad stammerer, absolute silence is enjoined during the early days of his tuition. Then follow lessons on the simple vowel sounds, and then the rhythmical utterance of words and sentences is adopted. With many stammerers the success of this method of treatment is considerable, and we doubt not that a large proportion may be practically cured by a patient drilling of this kind. Instances are tolerably common of stammerers who have broken themselves of their unfortunate habit by systematic drilling, and in extreme cases it might be necessary to follow the graduated system advocated by M. Chervin.—*London Lancet.*

HINTS AND QUERIES.

"He that questioneth much shall learn much."—BACON.

CORRESPONDENTS desiring a reply in this department are requested to make use of *distinctive signatures or initials*, and avoid the practice of signing their communications Reader, Subscriber, etc.

CORRESPONDENTS who wish notice to be taken of their communications should authenticate them with their names. We cannot insert queries or replies except they are so accompanied. Names not necessarily for publication.

WILL any of your readers who have a knowledge and experience of the cause and cure of stuttering and stammering kindly communicate the same, also names of good authors on the subject?—L. D. S.

See page 630, Periscope, of this number.—EDITOR DENTAL COSMOS.

WILL some one well informed give me the full process of bleaching teeth?—R. K. B.

WHEN was amalgam first introduced for filling teeth?—T. J. S.

REPLY TO DIX IN THE AUGUST NUMBER OF THE COSMOS.—The following preparation has given me uniform satisfaction as a *local anæsthetic:*

℞.—Pulverized camphor, ʒiv;
Sulphuric ether, f℥i.

Apply to the gums surrounding the tooth to be removed, with a pledget of cotton moistened with the preparation, until the gums turn white, when the tooth can be extracted with very little pain. My preceptor used the above for a good many years, with universal satisfaction to both his patients and himself.—J. W. ESSIG.

W. R. H., in the October number of the DENTAL COSMOS, asks how to prevent dark joints between sectional teeth. I can assure him that if my plan is adopted no more dark joints will W. R. H. have to contend with. We all know that rubber will not run after packing, by subsequent heating, further than what it has been actually pressed, *no matter how much open space is before it.* Knowing this, proceed to set up the teeth; flask and have them ready, so to speak, to pack. Now with a pencil or other instrument fill the (more or less V-shape) space between the blocks with oxychloride of zinc. *Do not* cut a groove around the front of the teeth; it only greatly destroys the resisting power of that part in the plaster. Leave that as it is, and confine yourself *solely* to the posterior part of the model,—that part which corresponds to the soft palate. Scoop out thoroughly (full length) the posterior edge of the matrix back to the flask, full depth if you desire, or about three times as much as you think the excess of rubber would take up. Knowing now that you have a chamber fully large enough to more than hold the surplus rubber, you proceed to ascertain, per model plate, the quantity of rubber required by gauge, making an allowance for surplus of about a one-quarter inch cross strip. Pack and bring the flask together as usual; you need not be afraid of screwing it too tight. If your excess chamber is large enough, a good joint is assured. The short answer to the question is, *Have a free outlet and a reception chamber large enough to enable you to dismiss all doubt of its adequateness for the surplus.*—C. S. W. S.

W. R. H. is recommended, after opening the flask and removing the wax, to fill the joints first with dry plaster, and then saturate with liquid silex, and, if possible, to let it stand over night. By this means he will not be annoyed by imperfect joints after packing and vulcanizing.—F. F. Drew, D.D.S.

To W. R. H., in October Dental Cosmos, who calls for a remedy for dark joints caused by penetration of the rubber, I offer my *modus operandi* in addition to the many that have already been given. It is a simple improvement of the "thread" plan.

The improvement consists in saturating the thread with liquid glass. Grind the joints V-shaped, deep enough only to admit a single strand of thread saturated with liquid glass, heat the flask before packing, so as to harden the liquid, and the joints will thus be rendered impervious to the rubber, and the desired result will be obtained. This is the most effectual method I have yet tried.—George Wood, *Hastings, Mich.*

As so much is said in our periodicals and associations about "plastic fillings," allow me to report the following without comment. The extract is from a letter written by a graduate of medicine, a gentleman of high standing:

"Wolfe Creek, January 23d, 1878.

"Dr. Speck.

"Dear Sir,—In the year 1830, when I was a student of medicine at Louisville, Kentucky, Dr. Baum opened an office next door to my preceptor's. I was probably his first patient. He had just arrived from Philadelphia; told me that he was a graduate of a Philadelphia medical college; was poor and must practice dentistry until he could do better. I requested him to extract a large jaw tooth, the interior of which was thoroughly decayed. After examination, he said he could make it as good as any tooth in my head. He removed all decay, leaving the walls very thin, and, after treating it for several days, filled it with a paste, which remains good to this day. The tooth has never been sore.

"I. G. Peck."

The writer has frequently examined the tooth; it is perfect. How the nerve or nerve-cavity was treated I could not learn. The filling is amalgam.

I have examined a tin filling forty-one years old, five gold fillings forty-three years old, an oxychloride filling seven years old, and several gutta-percha fillings (crude used for base plates) five years old. These are all in good condition, preserving the teeth.—Thomas J. Speck, *Morristown, Tenn.*

THE

DENTAL COSMOS.

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ORIGINAL COMMUNICATIONS.

ALVEOLO-DENTAL ABSCESS.

BY D. D. SMITH, M.D., D.D.S.,
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(Read before the Odontographic Society of Pennsylvania, Nov. 6th, 1878.)

ALVEOLO-DENTAL abscess is a common surgical affection, often attended with extreme suffering, and more or less serious consequences, according to the condition of the patient, the structure of the alveolar tissue concerned, and the location of the tooth. It is usually amenable to rational treatment, admitting of cure without loss of the tooth. It may be defined as an abnormal cavity containing pus, having its seat in the cancellated structure between the external and internal alveolar plates,—the result of degenerative changes in the root, pulp, peridentium, or associate parts.

A sac is generally formed through an effusion of lymph, limiting the pus-forming surface, and accommodating itself to the quantity of broken-down tissue present. This sac or limiting membrane is commonly situated immediately above or below the root of a tooth (according as it is in the upper or lower jaw) with which it communicates through the apical foramen. In single-rooted teeth it is nearly always in this relation, but in double or multi-rooted teeth it is not infrequently found between the roots, and occasionally just at the bifurcation.

Should a root causing an abscess pierce the antrum of Highmore, as is sometimes the case with the second superior bicuspid and the first and second superior molars, the sac may form in this cavity, giving rise to antral troubles.

Alveolo-dental abscesses are of two kinds, viz., acute and chronic. The acute variety exhibits the same symptoms as an acute abscess in other parts,—violent throbbing pain, redness, heat, swelling, tension, altered circulation, and the formation of new products; with a tendency to open by ulcerative absorption on the nearest surface.

Chronic alveolo-dental abscess may result from change in character or long continuance of the acute, or may exhibit subacute symptoms from the beginning. It is lacking in the activity and violent manifestations of the acute. The pain, while constant, is rarely intense; the discoloration is not marked; the temperature is but little increased; the swelling is usually but slight, and the tendency to new products not decided in character.

A marked and even diagnostic symptom is, inclination to infiltration of pus into the surrounding tissues. It may excavate the alveolar structure, involving two or more adjoining teeth, or it may find its way through the alveolar plate and burrow in the submucous tissue, dissecting its way between the periosteum and the bone (as the palate processes of the superior maxillæ), ultimately causing necrosis.

Such manifestations are found in persons of a strumous diathesis, and in the weak and debilitated from whatever cause.

A chronic alveolo-dental abscess, following an acute, is usually in connection with neglected roots, but may be associated with any tooth where the cause is allowed to remain.

The duration of the acute may be stated as from eighteen hours to ten days. With the exit of pus through the osseous structures the active manifestations, except the swelling, subside, and becoming chronic the discharge is continued, at intervals or continuously, as long as the cause remains; this may be for weeks, months, or even years.

Anæmia, strumous diathesis, the lymphatic temperament, pregnancy, and intemperance may be considered as predisposing causes. The exciting causes approximatively in the order of frequency are putrescent pulps, crownless roots of teeth, necrosis, pivoted roots (the canals containing putrescent pulps), filling-materials which have been forced through the apical foramen, salivary calculus, and mechanical violence to a tooth, as a blow.

An alveolo-dental abscess may point and open in one of nine ways: 1st, through the external alveolar plate and gums directly into the mouth; 2d, through the internal alveolar plate and gums directly into the mouth; 3d, externally or internally through the alveolar plates, emerging by a sinus through the mucous membrane at a point remote from the seat of the trouble; usually near the tuberosity of the superior maxilla, or behind the uvula; 4th, through the apical foramen and canal of the root, the pus escaping into the mouth from the crown of the tooth; 5th, from the seat of the abscess, downwards if in the upper jaw, upwards if in the lower jaw, between the peridentium and the cementum, and appearing at the free margin of the gum; 6th (in the lower jaw), from the under surface of the *body* of the bone, and thence directly through the integuments; 7th (in the upper jaw), externally through the cheek; 8th, into the antrum of Highmore, the pus passing through the middle meatus, to find exit from the nostril on the side of the lesion; 9th (when the trouble is in connection with the lower dens sapientiæ, situated far back in the coronoid process or at the junction of that process and the body), downwards and inwards through the osseous structures, under the cervical fascia, and thence to the thorax.

The prognosis of an abscess, in connection with single-rooted teeth, is almost always favorable.

(In classes fifth and ninth tetanus has sometimes supervened, and death from pyæmia has occasionally resulted from cases described in class fifth.)

The prognosis as regards the restoration of the tooth is favorable, excepting *lower bicuspids in class fifth*, and teeth described in classes sixth and ninth.

The more common sequelæ of alveolo-dental abscesses are, continuous discharge of pus; thickened peridental membrane causing a prolonged condition of "sore tooth"; facial neuralgia; indurations; osseous tumors, especially on the body of the lower jaw; necrosis of some portion of the maxillæ; trismus, and pyæmia.

The diagnosis is to be made from both general symptoms and the local manifestations.

In the acute form the general symptoms are, fever with its usual accompaniments of hot, dry skin, coated tongue, constipated bowels; more or less prostration, and often violent pain shooting down the neck or up through the face and head.

The local manifestations are more decided. The tooth at first seems elongated and is "sore" to the touch; a dull pain begins in the socket, but increases in intensity, and soon becomes throbbing; the parts in the immediate vicinity are more and more responsive to pressure, swelling and discoloration following. These phenomena continue and augment so long as the pus is confined within the alveolar walls, but coincident with its escape into soft tissue, the inflammatory activities are quickly modified, save only the swelling, which increases until the evacuation of the pus externally.

The treatment of alveolo-dental abscess may be either palliative or curative. Palliative treatment may be both general and local. The former consists in the use of morphia, opium, assafœtida, or quinia, according to the indications of the case; the latter is the more important, except in cases of great severity. It may consist in the application of extract of hamamelis, tincture of arnica or aconite, aconitia ointment (1 grain to 1 drachm of cerate), poultices, or the use of pepper-bags to induce free suppuration, and to prevent cacoplastic deposits.

Early extraction should be resorted to in all cases of crownless roots (excepting such as are valuable), partly erupted lower dentes sapientiæ, and most cases of bicuspids or molars which have no antagonists,—especially if there be considerable recession of the gum and alveolar structure.

A recent alveolo-dental abscess with a fistula opening directly through the gum, particularly if associated with single-rooted teeth, responds promptly and satisfactorily to well-directed treatment. If the abscess be in connection with a small and tortuous canal, as that often found in the anterior buccal root of a superior molar, or the compressed anterior root of a lower molar, the treatment is complicated by the mechanical difficulty of gaining access to the seat of the trouble.

In these, as in other cases, putrescent matter and *débris* of whatever kind should be thoroughly removed from the canal, and the entire pulp-cavity disinfected.

The cleansing of canals is best done by first protecting them from saliva, and wiping the cavity of decay dry; then with the free use of alcohol, a little cotton, and a probe of such shape as will readily pass into the canal, the offending matters may be easily and satisfactorily removed.

If then, with a probe wound with cotton, a little oil of cloves or creasote (preferably the latter) can be forced through the apical foramen, and thence out at the external fistula, the cure will be materially hastened; but drilling through the root to effect this should never be resorted to. (A white eschar at the mouth of the fistula indicates the passage of the creasote.)

Whether the medicament passes the apical foramen or not, it is better to dress the root with medicated cotton until the fistula is satisfactorily healed.

To dress a root, a few fibers of cotton are twisted into a thread one to two inches long, of a size to pass easily into the canal; the small end being dipped into the medicament (glycerin, creasote, or oil of cloves), the thread is passed to the end of the canal, and allowed to remain there. In whatever way the crown-cavity may be temporarily stopped, the root dressings should be easy of access. If the work of cleansing the canals has been thoroughly done, but two or three of these cotton dressings, renewed at intervals of two to four days, will usually be required to effect a cure.

If the pus, instead of establishing an opening through the gum, has found exit through the canal, the treatment is more complicated and much less certain in its results. As before, the pulp-cavity and canal should be carefully cleansed and disinfected, and the medicated cotton dressings (preferably oil of cloves or glycerin) applied. The cotton, however, should in such cases be so arranged as to be at the full command of the patient, to whom instructions should be given for its immediate removal on experiencing a sensation of *fullness* in the tooth,—this being the premonitory symptom of renewed inflammation in the peridentium. Under no circumstances, in these cases, should the first cotton be allowed to remain more than three or four hours. It is better that it should be removed by the operator than by the patient. Absorbent cotton, unmedicated, introduced and kept dry, is a valuable adjunct in the treatment of abscesses without external fistulæ, as by its absorbent properties it draws the pus to itself, which is thus better removed than by any other process.

This frequent stopping and unstopping, using oil of cloves for its purifying and soothing effects, will often effect a cure in ten to twenty days.

When the tooth will bear a tight cotton stopping for eight or ten days, especially if there be no unpleasant odor on its withdrawal from the canal, it may be permanently filled.

If the abscess be situated at the end of an inaccessible root, or if after repeated trials it does not improve under the stopping treatment, the root may be tightly closed and a fistulous opening forced through the alveolar walls and gum. With judicious stimulation this may be accomplished in from two to four days, when the case is reduced to one of the simplest form, and should be treated as already described.

The stimulation in such cases may consist of an application, every ten to twenty minutes, of a mixture of equal parts of tincture of capsicum and chloroform (well shaken), applied on a pellet of cotton over the surface where it is desired to establish the fistula. This, while an excellent stimulant, is difficult for the inexperienced to apply, for which cause it has been almost entirely supplanted, in my practice, by what are known as "pepper-bags," a device of my friend and former colleague, Dr. J. Foster Flagg.

Pieces of thin muslin and of the lightest muslin rubber, about one-half by three-fourths of an inch each, are sewed together on three sides, making an open sack.

Into this sack are introduced equal parts of powdered capsicum and ginger, covering the inner surface to a thickness equaling, perhaps, an ordinary blotting-pad. The bag is then closed by sewing up the fourth side.

These little pepper-bags, dipped in water before using, are applied muslin side to the gum of the affected tooth; by this means constant and bearable stimulation can be kept up, as the medicament acts readily through the muslin; while the rubber of the other side being impervious, protects the mucous membrane of the lip or cheek. This device is as ingenious as it is useful.

The diagnosis of an abscess at the *bifurcation* of the root is often exceedingly difficult.

The diagnostic signs are, almost equal response to pressure in various directions; inability to use the tooth in mastication, and *movement* of the tooth, greater or less, in its socket. The liability to such form of abscesses is chiefly from anatomical formation in the lower molars.

The treatment consists in evacuation of the pus from the alveolar socket. This can sometimes be accomplished by trephining the alveolar plate into the bifurcation, but more commonly by drilling through the tooth from the pulp-cavity directly upon the abscess, and afterwards injecting it occasionally with dilute sulphuric acid (acid 1 part, water 3 parts).

If a cure from medication is possible, it can generally be effected in this manner.

As a last resort, the tooth may be extracted, the abscess dissected from it (for the abscess will always come away with the tooth), and the tooth replanted.

With the most skillful treatment, a considerable percentage of cases will result in failure and eventuate in extraction and loss.

An alveolo-dental abscess dissecting the peridentium from the cementum is generally associated with an anæmic, possibly a typhoid, condition, or with want of tonicity of the tissues generally. The marked local symptoms are sensitiveness to pressure, looseness of the tooth, and the oozing of pus from about its neck. The treatment of these cases is always difficult and often unsuccessful.

If the tooth be situated in the lower jaw, unless specially valuable, early extraction is the safest plan to pursue. In the effort to save the tooth, the pus should, if possible, be diverted from the channel which it has established for itself to an opening made through the *alveolus* and *gum*. If the abscess be then treated with dilute sulphuric acid, and the peridentium with applications of chloride of zinc, a satisfactory cure may generally be expected.

Abscesses with external fistulæ through the cheek are rare, but a good prognosis can generally be given. The method of treatment will suggest itself from that indicated for other conditions.

In the lower jaw external fistulæ are not infrequent, gravity assisting materially to produce such an untoward result. If the subject be a female, the unsightly scar, which is the usual result, ever remains a disfigurement.

The sacrifice of the tooth giving rise to the trouble is not a necessity, for in a moderate percentage of cases the abscess may be successfully treated through the root. The external scar left from such an abscess is usually much less disfiguring if a cure is effected with the tooth in place; but unless it be especially valuable, it is safer, after the healing of the abscess, to extract to prevent recurrence.

The pulp-cavity and root should be thoroughly cleansed and disinfected, and then dressed with one of the medicaments (glycerin, oil of cloves, a saturated solution of salicylic acid in oil of cloves, dilute sulphuric acid), as already recommended. By this treatment, provided the root be an accessible one, healthy granulations may be induced, and the abscess healed from the bottom.

For an abscess in connection with an inferior dens sapientiæ, situated in the parts in the angle of the jaw, the extraction of the tooth is always to be resorted to if it be possible of accomplishment. Often in such cases the tooth is but partially erupted, or the crown much decayed. This, with the swollen condition of the parts, and the consequent inability to distend the mouth, may present insuperable obstacles to extraction.

Such cases demand the most active treatment, with a view of inducing a discharge of the pus through the gums, or at the worst an external fistula.

In addition to what has been already recommended, poultices may be applied externally, incisions made, or such other treatment adopted as the exigencies of the case may demand. The danger consists in pus finding its way under the strong cervical fascia, and thence to the thorax.

In extracting for alveolo-dental abscess the after-treatment is often of great importance.

Should the sac come away with the root, the trouble is practically at an end; if it does not, unless properly cared for, a recurrence of the abscess may be looked for.

A solid clot forming in the socket will effectually confine the pus, causing a speedy renewal of all the symptoms, intense pain, rapid swelling, etc.

The diagnosis and treatment, although plain, are frequently wholly misunderstood, causing much needless suffering to the patient.

The socket of an abscessed tooth, after extraction, may be soothed and kept free from a hard clot by syringing occasionally with tepid water, or a mixture of equal parts of warm water and laudanum; or if a more active detergent is indicated, perhaps the best is a wash composed of one part of alcohol to two parts of *phénol sodique.*

DENTAL PATHOLOGY AND THERAPEUTICS.

BY J. FOSTER FLAGG, D.D.S.,
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[Entered according to Act of Congress, in the year 1873, by J. Foster Flagg, D.D.S., in the office of the Librarian of Congress at Washington.]

(Continued from page 582.)

XIV. *Previous periodontitis associated with the passing of "time," or with adynamic, uterine, enteric, or other systemic complications.*

Just in proportion to the gravity of that which is known as *disease* in connection with a tissue, so is the re-establishment of *normality* rendered impossible.

Slight irritation permits, *usually*, of the return, *practically*, to health.

More decided irritation renders this result less possible.

Slight inflammation permits *occasionally* of the re-establishment of *apparent* normality, but it much more frequently gives decided evidence of what is termed "weakness" of the part, by seasons of irritation, if not of recurrence of positive, though slight, inflammation.

Severe inflammation may be regarded, practically, as a deviation from normality so great as to preclude the possibility of a return to absolute health on the part of any tissue or organ so affected.

The return to normality after such deviation is always *relative*, and is defective in proportion to the delicacy and complexity of organs, as illustrated by the continued susceptibility of brains, lungs, or kidneys after having suffered from severe inflammation; or again, is equally defective in proportion to the low grade of recuperative power of tissue, as illustrated by severe inflammation of cartilage, as the nasal cartilage.

Less susceptible to recurrence of inflammation, but still susceptible, is the peridental membrane, and it is this fact which gives great importance to this "cause" for periodontitis, and which renders it a point for careful study, second only to "putrescent pulp."

In the normal tooth all the different tissues are possessed of vitality according to the degree of each, which vitality is maintained by the *combined* efforts of pulp and peridentium.

The pulp having lost its vitality, both enamel and dentine are dependent solely upon their own physical characteristics for a maintenance of integrity.

It has been shown that so far as the progress of dental caries is concerned, a singular proof of its slight relation with vitality is found in the fact that pulpless teeth will sometimes decay more rapidly than they did while yet their pulps were living; while, on the other hand, it is frequently noticeable that, with the loss of their pulps, teeth which have decayed with great rapidity will become so resisting to the decaying influence as to remain intact for a score of years, and even more.

But while this is so, it is none the less true that both enamel and dentine are *dead*, that living cementum is in apposition with dead dentine, and that the work of maintaining this unnatural connection devolves upon the peridentium.

It is thus that *double duty* is entailed upon this membrane, and the functional activity which is then developed naturally places it in the same category with all overworked organs or tissues.

If the *vocal power* is overworked, if it is forced to do *double duty*, laryngitis is the result, and a continuance of effort eventuates in frequent recurrence of inflammation with increasing gravity of complication.

If the *sight* is taxed until it is made to do double duty, sympathetic inflammation is developed, and ophthalmia of varied grade soon establishes a condition which entails the "habit" of recurrence with every trifling irritation.

By the same law of vitality an *inevitable* and *irremediable* condition of overwork devolves upon the peridentium of such teeth as have lost their pulps.

It is this point which should be dwelt upon by the practitioner in his mental discussion of the value of any given pulp.

It is this fact which militates seriously with the *advisability* of long-continued, *gradually-failing* efforts to maintain the vitality of sickly pulps.

It is this fact that leads me to teach, as the result of long, extensive, and very careful observation, the inadvisability of incurring the increased danger to long-continued usefulness, which arises from subjecting the membranes about the roots of such teeth as have to lose their pulps to the additional infliction of the *gradual death* of these organs.

The subsequent record of such teeth has not *proven* nearly so satisfactory as has that of those whose pulps have been promptly devitalized and satisfactorily extirpated.

In this way, according to my experience, is the peridentium left in the best possible condition for assuming its work of double functional duty, and for maintaining it most satisfactorily for the greatest length of time.

But even with this giving of the best possible chance for future, long-continued, comfortable usefulness, it still remains that a *predisposition* towards peridental irritation and inflammation is steadily gaining ground, and thus, with every passing year, it is more and more likely that *periodontitis* will become pronounced, as the result of *any* of its *exciting* causes.

But it is under this head of "previous periodontitis" that I wish to direct *especial attention* to the fact that this condition having once existed in connection with an always overtaxed membrane, it is rendered *doubly* liable to recurrence, and that the peridentium is increasedly responsive even to slight irritation.

Thus it is that, while adynamic conditions, arising from whatever cause, will frequently become the first excitant to peridental inflammation in connection with pulpless teeth, it is, nevertheless, unquestionably true that periodontitis, having been once developed, as the result of pulp-putrescence, a lesser degree of systemic weakness is more surely liable to produce a repetition of this condition.

But it is not alone with *pulpless* teeth that peridental irritation is liable to occur as one of the concomitants of an anæmic condition, for the peridentium of all the teeth necessarily sympathizes with the generally impaired functional action, and is thus rendered less resistive to irritants just in proportion as the anæmia is decidedly pronounced.

Keeping this fact in remembrance, and yet recognizing that pulpless teeth are, in the main, those which are most liable to recurring periodontitis from *systemic* complications, *and that this is due to their being pulpless*, I shall present this subject under the four subdivisions of time, uterine complications, enteric disease, and other systemic diseases.

Time.—The peculiar anatomical considerations which pertain to the position of the peridentium are such as to render recuperation after disease difficult, and recurrence of irritation liable.

The direct impinging of blows upon this membrane during the act of mastication; the thoughtless and frequent unnecessary violence inflicted by needless effort, such as cracking nuts, chewing ice, biting off threads, and untying knots, together with the unyielding character of the walls of the alveoli, places the peridentium in a twofold condition of helplessness which is of infrequent parallel throughout the entire economy.

With every chance for violent infliction, and with the least possible chance for recuperation, or even for moderately continuous exemption from irritation, this overtaxed membrane most certainly has not had sufficient thought bestowed upon it by those whose professional position makes of them its natural protectors.

It is this want of thought and knowledge upon the part of a large proportion of the practitioners of dentistry which, even yet, renders it an every-day opinion that "a tooth *diseased at the root* is of little value, and had better be extracted."

There is a failure to recognize that, after a tooth has lost its pulp, every possible infliction should be guarded against, and every possible avenue of *recurrence of irritation* be most sedulously barricaded or prepared for.

It is thus that the filling of the canals of such teeth in such wise as to preclude the possibility of the removal of canal fillings in case of need, together with the subsequent act of inserting such fillings as require hours of mechanical infliction of great violence, and even on to the non-recognition of the imminent danger from the *slightest*—the *very slightest*—excess of filling material, or *most trifling* mal-occlusion, are each and all just so many preventives to a universally long-continued usefulness of pulpless teeth.

Even under the most favorable circumstances, and with a careful abstinence from all irritation, coupled with the most thorough preparation for all possible subsequent emergencies, it is only a question of "time" with pulpless teeth as to their liability eventually to *give trouble*, and as to their eventual *loss*.

I desire to impress this view precisely as *I have tried to impress the danger of an improper use of arsenious acid.* I have advocated the use of this medicament, and have combated the fallacy of certain "accepted" ideas, as taught by text-books, in regard to apical poisoning. So now, as I have taught that I regard *prompt pulp-devitalization*, when indicated, as *better* than the practice which generally results in the gradual death of the pulp, I equally desire to plainly state, again and again, the great value of a healthy pulp, and the great detriment which results from the loss of this organ.

As I regard a tooth with a pulp doing normal duty as *almost* sure to last a lifetime, so do I regard a tooth without a pulp as equally sure *not* to last a lifetime, and even *more sure* to have, more or less frequently, seasons of tenderness, pain, swelling, and even suppuration, and this, too, without any other obvious cause than the passage, between each occasion of suffering, of a certain indefinite *length of time*.

That pulpless teeth do frequently last for fifteen, twenty, or even thirty years, is very well known; that such teeth might do comfortable service for even a longer period than this, is not denied; but for every *one* such mutilated tooth that gives a score of years of *comfortable* usefulness, *fifty*, at least, are not only not retained without seasons of tenderness, or even suffering, but are *lost* before the passing of twenty years.

I think it will be admitted that I have made a more than sufficiently low estimate of the loss of these teeth, for I believe that, at present, a very much greater loss is sustained as the result of *average* practice.

I wish to impress this forcibly, that I may thus prepare the mind of the reader for the kindly acceptation of the views which I shall present in relation to such preparative treatment and manipulation as has regard to future *possibilities.*

I wish to urge the position that it is *not always true* that "a tooth diseased at the root is of little value," and that such opinion is still less entitled to respect if the cause of such disease be the absence of a pulp, and still less again, if the cause be the *presence of a putrescing pulp.*

I wish to urge the opinion that a thoughtful consideration of this subject, and a proper trial of the method of operating and medicating which I shall suggest for such cases, will soon prove that an almost universal cure is a thing of such easy accomplishment as to make of *most* teeth which are "diseased at the root" organs of *much value.*

Uterine complications.—I have on a previous occasion referred to an old adage which runs thus: "a tooth for a child." It was the recognition of a *fact*, and the failure to recognize the *cause*, which gave birth to this saying.

The dental therapy of the present admits no such necessity. It recognizes the predisposition to irritation which pertains to such conditions as are now under discussion It recognizes the increased susceptibility to sympathetic irritation which is a frequent concomitant with pregnancy.

It recognizes the great draft upon systemic power, which, under modern modes of living, seems ever more decided. It recognizes the diminished capability for enduring pain, but with all this it also recognizes its ability, in a vast majority of cases, to clearly discern the *exact* nature of the local dental manifestation, and to so treat as to *exactly* meet the indications.

Although it is conceded that at any time during pregnancy a concomitant dental difficulty may arise, it is, nevertheless, a matter of observation with me that the second, third, fifth, seventh, and ninth months are those in which this complication is most liable to occur.

I would be understood as referring now particularly to *peridental* irritation, for it will be readily recognized that pulp-irritation is, to a considerable extent, governed by the *progress of decay*, and that this modifying influence does not exist in connection with periodontitis.

It is for this reason that the "treated teeth" of female patients should be even more carefully *prepared* for future contingencies than are those of males; not that extra effort should be made invidiously, but that as one would, and should, use more precaution in guarding a weak point than would be deemed needful for securing a strong one, so should the *probability* of future peridental irritation in case of pregnancy be guarded against for females more accurately than the *possibility* of future irritation about the teeth of males.

But it is not only when in a pregnant condition that exceeding sympathy between uterus and teeth is pronounced, for functional disturbance of the uterus has, quite frequently, as a concomitant excessive general dental sensibility.

At times this amounts only to sensitiveness of dentine, tooth-edge, or the like; but again, it develops as a general tenderness during mastication, with a special tenderness amounting to periodontitis of low grade in such teeth as have lost their pulps, and particularly in such as have had, upon one or more occasions, decided periodontitis.

(To be continued.)

NOTE.—Since the issue of my article on the methods of diagnosing *excessive* amount of filling-material upon the *articulating* faces of teeth, Dr. W. B. Kelly, of Towanda, Pa., has directed my attention to the use of Selleck's Magic Impression Paper, which is so efficacious a device that I desire to give it especial notice.

By placing a small square of the paper either upon the filling or the antagonizing tooth, and letting the patient bite upon it, a *mark* is left, indicating the exact position of excess.

THE DISTRIBUTION OF LIVING MATTER IN HUMAN DENTINE, CEMENT, AND ENAMEL.

BY C. F. W. BÖDECKER, D.D.S., M.D.S.

(Read before the American Dental Association, Niagara Falls, August, 1878.)

(Continued from page 590.)

CEMENTUM.

IT has been long known that there exists a striking analogy between the structures of the cementum and bone.*

If we consider the central or pulp-canal of the tooth as a formation analogous to a Haversian canal, containing blood-vessels, nerves, and medullary tissue, then the surrounding cementum corresponds to a Haversian system of ordinary bone, between which and the pulp-canal there exists an intermediate stratum of dentine.

The zone of dentine is not present all around the pulp-cavity on the apices of the roots; there the cementum, being the outermost layer of the tooth, directly lines the cavity.

Delicate parallel striations are to be seen in the cementum, identical with the lamellæ of a Haversian system, and as a rule more plainly marked near the periphery than towards the dentine. The lamellæ exhibit a more or less concentrical arrangement around the pulp cavity, easily demonstrable on cross-sections.

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* By some authors the dentine has been termed "Tooth-bone." It seems as if this name were applicable with considerably more propriety to the cementum; the latter term having no proper sense. The difficulty of introducing new nomenclature into anatomy on the one hand, and the shortness of the word cementum adapting it for combinations, such as cementitis, etc., are the reasons why I retained this term.

Within the basis-substance of the cementum there are numerous branching spaces, in correspondence with the lacunæ of bone. The offshoots of these spaces in the cementum, like the spaces themselves, are very marked in dry specimens, because of their being filled with air. In chromic acid specimens, on the contrary, the offshoots are much less prominent, and the less the more thoroughly the decalcification has been effected by the acid. No essential difference is noticeable between the lacunæ and canaliculi of ordinary bone and those of the cementum; in both tissues there exists a great variety as to the general arrangement, the size of the lacunæ, the number and ramifications of their offshoots.

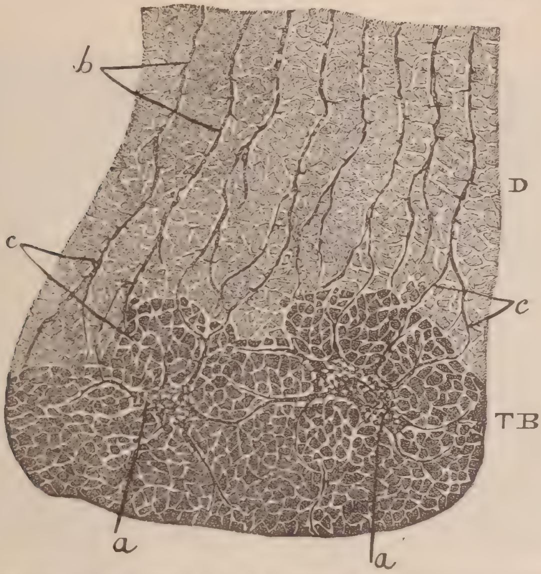
The walls of the lacunæ and the coarser offshoots, if viewed with a highly magnifying lens (immersion, 1000 to 1500 diam.), appear interrupted on their peripheries by light spaces, which lead into a light, delicate net-work, piercing the whole basis-substance to such an extent that only the meshes have to be considered as the fields of calcified glue-giving basis-substance.

Each lacuna contains a protoplasmic body, with a central nucleus,—the cement-corpuscle. The nucleus sometimes is relatively large and surrounded only by a narrow seam of protoplasm; while in some small lacunæ a body of the appearance of a nucleus is present without a noticeable amount of surrounding protoplasm. The netlike structure of both the nuclei and the protoplasm is plainly visible on all cement-corpuscles. From the periphery of each corpuscle conical offshoots arise, the coarser of which penetrate into the larger offshoots of the lacunæ, while the finest offshoots of the protoplasm traverse the light rim between the wall of the lacuna and the periphery of the protoplasm, being directed towards a light interruption on the boundary of the lacuna.

Cement-corpuscles, on the average, are round or spindle-shaped bodies, the long diameter of which corresponds to the direction of the lamellæ. In teeth of juvenile and middle-aged persons we meet with cement-corpuscles surpassing three or four times the size of ordinary ones, in which two or three nuclei are visible. Instead of multinuclear bodies, a number of medullary nucleated elements may fill a large lacuna, all these elements being connected with one another by very delicate threads. The longitudinal diameter of such large lacunæ is sometimes arranged radiately, therefore, vertically to the direction of the lamellæ.

Numerous cement-corpuscles send broad and branching offshoots through the basis-substance in a vertical or oblique direction to the lamellæ, and not infrequently a direct union is established between two or three cement-corpuscles by means of such large offshoots (Fig. 4, *a*, *a*).

FIG. 4.

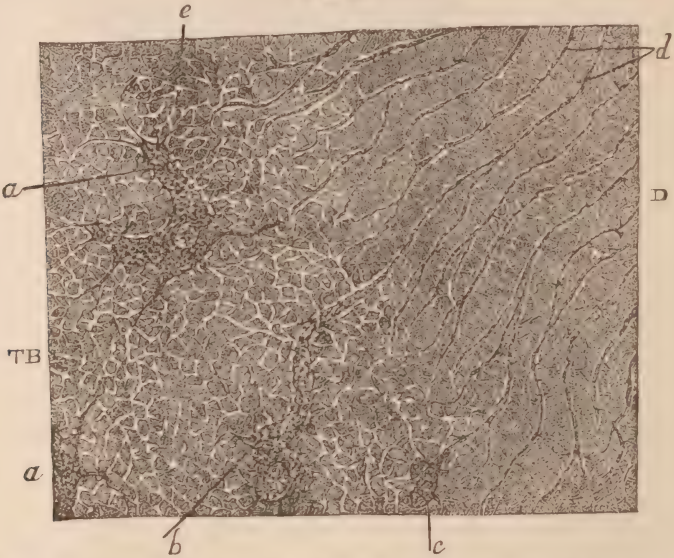


Union between dentine, *D*, and cement, *TB*; *a*, *a*, cement-corpuscles with large, branching offshoots, connected with each other as well as with the dentine-fibers, *b*, at the bifurcation of the latter, *c*, *c*. Magnified 1200 diameters.

In some teeth broad, spindle-shaped spaces pierce the cementum in a radiated direction, all of which contain protoplasm with delicate offshoots directed towards the net-work in the basis-substance. Nay, sometimes medullary spaces traverse the lamellæ in different directions, which, besides a varying number of medullary elements, contain capillary blood-vessels, evidently in connection with the capillaries of the periosteum. These formations may be considered as remnants of the embryonic condition of the cementum, and are never present in large numbers. All protoplasmic formations within the cementum, though greatly varying in shape, agree in being connected with each other by the delicate net-work, which pierces the basis-substance.

On the periphery of the cementum, on the line of the connection with the periosteum, the net-work of the protoplasm is usually very broad, and the fields of the basis-substance show a prevailing globular appearance. Also numerous spindle-shaped protoplasmic bodies are seen in connection with the cementum in an oblique arrangement, forming the transition into the structure of the periosteum. Between the calcified cementum and the striated connective tissue of the periosteum there often exists a narrow zone, occupied by closely packed spindle-shaped protoplasmic bodies only. In the periosteum itself there are less numerous, partly nucleated protoplasmic bodies, between which the fields of an apparently homogeneous glue-giving basis-substance are seen.

FIG. 5.

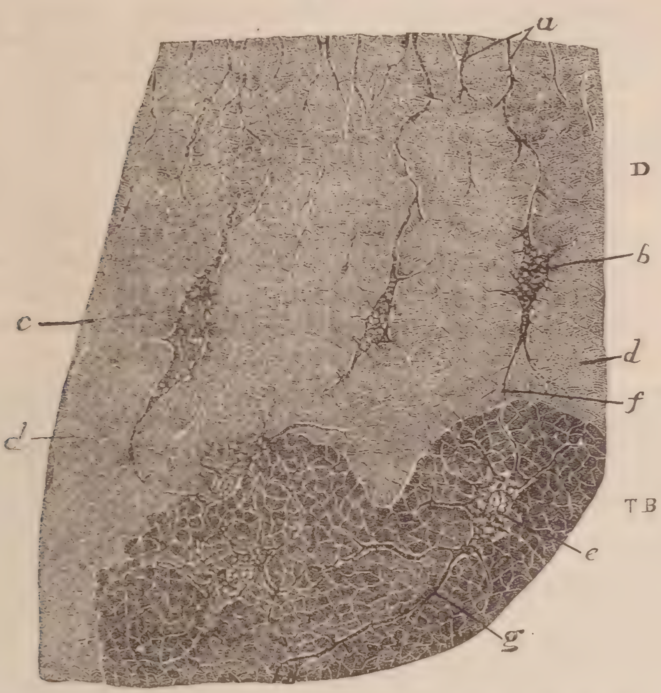


Transition of dentine, *D*, into cementum, *TB*, without a marked boundary; *a*, *a*, ordinary cement-corpuscles, *b*, spindle-shaped large, and *c*, spindle-shaped small cement-corpuscles, both in direct connection with dentinal fibers, *d*. Magnified 1200 diameters.

The connection between dentine and cementum is established either by a gradual change of one tissue into the other, without a distinct line of demarkation, or there exists a boundary formed by a more or less marked wavy line, presenting irregular bay-like excavations. Lastly, it occurs that between the bay-like excavations and the dentine there is interposed a stratum of the structure of cementum, with a gradual change of the tissue of the former into that of the latter.

Where a gradual change takes place, the dentinal canaliculi show irregular, mainly spindle-shaped enlargements, which stand in the direction of the dentinal canaliculi themselves, or run obliquely through the basis-substance of the cementum. The distal end of such a spindle is, as a rule, in connection with a regular lacuna of the cementum, or with an analogous formation of a neighboring dental canaliculus. Many of the latter simply pass into the light, delicate net-work characteristic of the basis-substance of cementum. The dentinal fiber is in direct union with the protoplasm, which fills the spindle-shaped spaces, or it is lost to sight upon entering the net-work of the basis-substance of the cementum.

FIG. 6.



Transition of dentine, *D*, into cement, *TB*, with an intermediate layer of cement-structure: *a*, bifurcating dentine-fibers, in union with elongated cement-corpuscles *b* and *c*; the latter imbedded in the basis-substance *d*; between this and the regular cement, with protoplasmic bodies *e*, the wavy boundary; all cement-corpuscles united with each other by large offshoots, *f* and *g*. Magnified 1200 diameters.

Where a boundary with bay-like excavations is present between dentine and cementum, spindle-shaped enlargements of the dentinal canaliculi may be seen much smaller than in the former instance. The majority of the dentinal canaliculi, however, reach the boundary of the cementum after repeated bifurcations, by which both the calibers of the canaliculi and their central fibers are gradually diminished in size.

A connection of the dentinal fibers with the coarser offshoots of the cement-corpuscles is often observed. The light net-work of the basis-substance of the dentine always passes into that of the cementum. Not very rarely, also, on the bottom of a bay-like excavation, partly nucleated protoplasmic bodies are present, into which the dentinal fibers inosculate. The connection between these and the coarser offshoots of the cement-corpuscles under these circumstances is established by such intervening protoplasmic bodies.

For the designation of the protoplasmic formations between the dentine and enamel, and dentine and cementum, I choose the term "Interzonal layer" as first proposed by Dr. W. H. Atkinson.

Neck of Tooth.

There are certain peculiarities about the minute anatomy of the neck of the human tooth which, so far as I can judge from the literature within my reach, have not been heretofore mentioned.

John Tomes ("System of Dental Surgery," 1873), in describing the distribution of the dentinal tubes, says, "Near the neck they stop short of the cementum."

This assertion is in accordance with my own observations. In the great majority of teeth neither the canaliculi nor their contents, the dentinal fibers, reach that part of the cementum which surrounds the neck. Near the periphery of the dentine bifurcations of the canaliculi—and consequently also of their tenants, the dentinal fibers—take place, some of the finest terminations of which run to the boundary between the dentine and cementum. As a rule the finest terminations of these fibers are lost to sight in a net-work somewhat coarser than that of the basis-substance of ordinary dentine. The minute elongations of the dentinal fibers can also be traced into the light net-work with more distinctness than elsewhere in the dentine. Sometimes the dentinal canaliculi, when approaching the periphery, become slightly dilated so as to produce slender pear-shaped cavities, in accordance with which the terminating dentinal fibers exhibit slight enlargements.

The boundary between dentine and cementum presents a wavy line, traversed by delicate threads, or occupied by spindle-shaped protoplasmic formations, all of which are in union with direct or indirect elongations of the dentinal fibers.

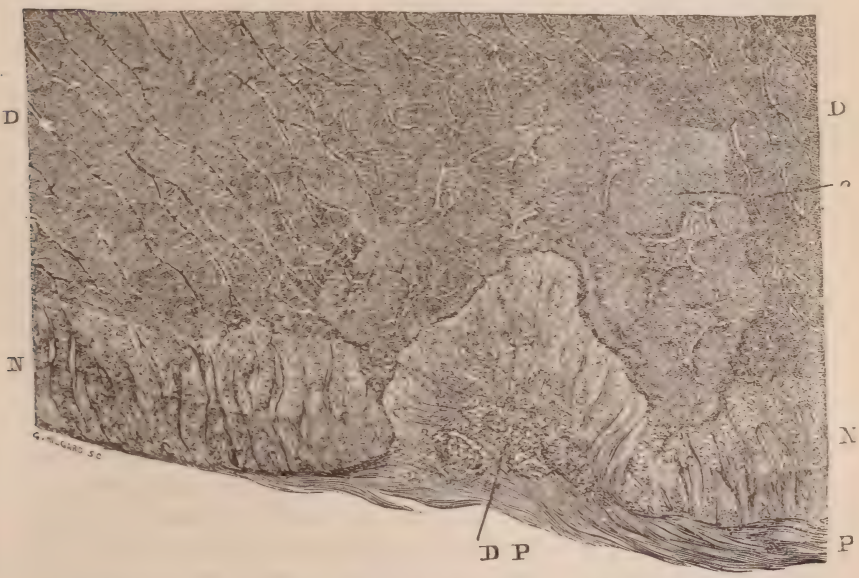
The cementum around the neck forms a narrow layer, which is cut off obliquely at the place of junction with the enamel. Both the cementum and enamel in this situation—being of the same width—are separated by a boundary which runs from the outer periphery obliquely downward to the dentine. This relation I found in the majority of teeth, and it is only exceptionally that I have met with cementum regularly overlapping the enamel. The cementum on the neck is built up by delicate prisms, or spindles, arranged vertically to the surface of the dentine. The prisms represent the fields of the basis-substance, and are separated from each other by light rims, holding beaded fibers, or traversed by delicate vertical threads. In transverse sections, when the prisms are cut obliquely, they exhibit irregular opaque fields separated from each other by light rims.

These formations closely resemble the protoplasmic bodies of the periosteum next to the cementum, alluded to in the former chapter;

hence I do not hesitate to consider the bony formation on the neck as being produced by calcification of the osteoblasts of the periosteum. The cementum on the neck of the tooth is devoid of lamellæ and lacunæ, which appear deeper below, together with all the characteristic features of the fully-developed structure of the cementum. The lamellæ become the more distinct, and the lacunæ, with their contents (the cement-corpuscles), the more numerous, the broader the diameter of the layer of the cementum.

The outer surface of the cementum is covered on its upper part with epithelial elements, in close resemblance with those of Nasmyth's layer of the enamel. This layer turns over into the epithelial coat of the gum. Farther down, the cementum, though still endowed with properties characteristic of the neck of the tooth, is surrounded by the fibrous connective tissue of the periosteum.

FIG. 7.



Anomalous formation of cementum on the neck of a human tooth. *D*, *D*, dentine; *N*, *N*, cementum on neck of tooth, with spindle-shaped or prismatic fields of basis-substance; *D P*, depression in the cementum of the neck, filled with elements of periosteum, surrounded upward by a zone of regularly developed cementum. Magnified 1200 diameters.

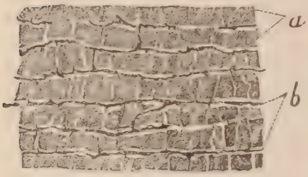
I have met once with striking formations on the neck of a tooth, which I consider anomalous, but not quite pathological. Here the ordinary cement of the neck is interrupted by grooves or pits containing the elements of periosteal tissue. The inner periphery of the pit is covered with a well-developed, evidently isolated, formation of cementum. The island of the cementum is broadest above the bottom of the pit, and slopes down along the walls of the pit until it is lost within the layer of the cementum of the neck.

ENAMEL.

The best specimens for examination of enamel I obtained by grinding fresh teeth, and staining them for one hour with the half per cent. solution of chloride of gold, as mentioned in the description of methods for the examination of teeth in general.

Up to this time the impression of most examiners has been that the enamel is built up by bundles of rods, or prisms, crossing each other, and traversed by faint vertical lines, which give each of them the appearance of a column, subdivided into small squares. The enamel rods doubtless exist, and are wavy close to the dentine, and straight on the periphery and the main mass of the enamel. They may be considered as columns of a calcified substance, between which minute spaces are left, analogous to the cement-substance of epithelial formations.

FIG. 8.



Longitudinal section of enamel. *a*, enamel-rods, traversed by prevailing vertical spaces; *b*, enamel-fibers, branching and partly uniting through delicate offshoots; numerous fine thorns of the fibers directed towards the light interruptions within the rods. Magnified 1200 diameters.

In longitudinal sections we see delicate beaded fibers, which occupy the central portion of the interstices between the enamel-rods. These fibers I propose hereafter to term the "Enamel-fibers."

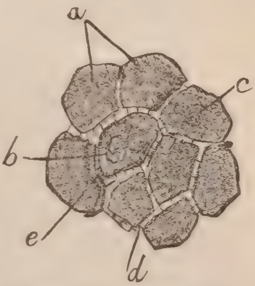
From such a fiber arise very minute conical fibrillæ, which traverse the rims between the fiber and the neighboring outlines of the rods, and fade away from the moment they enter the latter. The columns of the basis-substance themselves are pierced by delicate canaliculi, running in an almost vertical direction through the enamel-rods, regularly enough to give the appearance of squares, although these are much smaller than usually represented in the books. In the midst of a minute square light canals are seen, not infrequently running parallel with the outlines of the enamel-rod. The square fields thus produced by the rectangular crossing of light channels look, under the power of 1200 diameters, finely granular. In specimens not fully decalcified it is impossible to decide whether there is a light net-work within the enamel prisms analogous to that in the basis-substance of the dentine and cementum, or whether the granular appearance is merely due to the depositions of lime-salts. In thoroughly decalcified specimens of enamel, however, such as were first made by Dr. Frank Abbott, there is no difficulty in seeing, with high powers, the reticular structure of protoplasm. I am indebted to the above-named observer for having first drawn my attention to this fact.

Cross-sections of the enamel, which we obtain also in longitudinal sections of the tooth, on account of the different directions of the bundles of the enamel-rods, plainly exhibit the irregular polyhedral fields of the enamel-rods. The light interstices between the polyhedral fields contain in many instances delicate-beaded fibers, surrounding the polyhedral fields of the enamel-rods. The fibers, if cut transversely, have the appearance of dots, and connect with each other directly or by means of intervening delicate threads.

Extremely fine thorns traverse in a vertical direction the light space between two neighboring enamel-rods, even where a fiber is not visible. These threads are identical with the delicate thorns, first described by Max Schultz in 1864, in the cement-substance of epithelial formations.

The rods of the enamel on an average are half the diameter of the columns of the basis-substance in dentine; therefore four columns of the former will correspond to two of the latter, and consequently two dentinal fibers will answer to four enamel-fibers. Sometimes in the cross-section of an enamel-rod I met with roundish formations occupying the center of the rod, one or two in number, which, owing to a denser granulation and a surrounding shell, have the appearance of nuclei. The enamel-fibers run a very straight course towards the surface, and are here, in the average, a trifle thicker than near the boundary of the dentine.

FIG. 9.



Cross-section through enamel. *a*, rods of enamel, partly exhibiting formations like nuclei; *b*, *c*, *d*, light interstices between the rods traversed by delicate beaded fibers, *e*, or by vertical thorns. Magnified 2000 diameters.

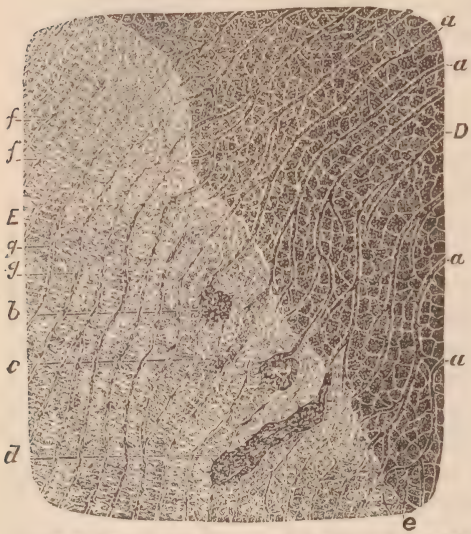
The outermost surface of the enamel is covered by flat epithelia (Nasmyth s membrane), which in the transverse section have the appearance of shallow spindles; not infrequently there also occurs a stratified epithelium on the surface of the tooth. The enamel-fibers are in connection with these epithelial bodies, which, if detached, show delicate offshoots adhering in regular intervals—the broken enamel-fibers. Sometimes the surface of the enamel is coated by a thin uniform layer of protoplasm, with regularly scattered nuclei. In such an instance single epithelia are not traceable, though scarcely any doubt can arise about the epithelial nature of this layer.

At the place of junction of the enamel with the dentine a direct connection is often seen between the enamel and dentine-fibers. The latter, through repeated bifurcations, being closely brought together, continue their course into the enamel-fibers without any interruption. The direction of the fibers of the two tissues, however, is almost never identical, inasmuch as the enamel-rods, and consequently the enamel-fibers, as a rule, owing to their wavy course in this situation, are obliquely intercepted upon the dentine.

We can very often trace dentinal fibers up into the enamel in a varying distance, without a distinct union between the enamel and dentine-fibers, as the former do not reach the surface of the dentine, but terminate above its level in different heights, while the zone close above this is occupied by a delicate, irregular net-work analogous to that of the dentine. Here no rods of enamel are visible either in longitudinal or transverse sections, but with low powers of the microscope only a finely granular layer is presented.

In many places the dentinal canaliculi upon entering the enamel suddenly become enlarged, and form more or less distinctly spindle-shaped cavities of greatly varying diameters, analogous to the spindle-shaped enlargements on the the boundary of the cementum. These enlargements run either in the main direction of the dentinal canaliculi or deviate obliquely. They invariably contain protoplasmic bodies, which plainly show the reticular structure, and sometimes contain one or more compact clusters to be considered as nuclei. The spindle-shaped protoplasmic bodies, on their proximate ends, are in direct connection with the terminations of the dentinal fibers which have arisen from their repeated bifurcations, while on the distal end they may show delicate fibers, viz., enamel-fibers, or delicate conical thorns, traversing the light space between the surface of the protoplasmic body and the wall of the cavity. These thorns are lost to sight on passing into the net-work at the bottom of the enamel. In some places, especially on the cusps, the spindle-shaped enlargements of the dentine-fibers are quite numerous, and of an almost uniform size and direction, forming regular rows of spindles within the enamel. In the teeth of younger individuals, the spindle-shaped enlargements are comparatively larger and more regular than in the teeth of old people.

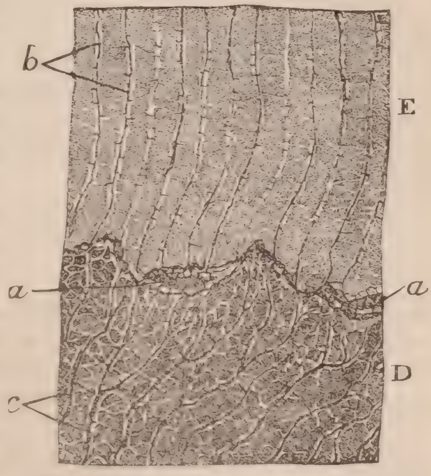
FIG. 10.



Union of dentine with enamel. *D*, dentine; *E*, enamel; *a*, *a*, dentinal fibers, being in union with large protoplasmic bodies *b*, *c*, *d*, or directly running into enamel-fibers *e*, *g*. The latter often are lost in the delicate irregular net-work on the bottom of the enamel *f*, *f*. Magnified 1200 diameters.

The boundary line between the dentine and enamel is either straight or slightly wavy, and with more or less deep bay-like excavations, analogous to those on the boundary between dentine and cementum. The concavities of the bays are directed towards the dentine. In this interzonal layer at the bottom of the bays we meet with fibers occupying the curved spaces between dentine and enamel. or we will see in a correspondingly bent direction protoplasmic bodies directly connected with the dentinal fibers downwards, and with the enamel-fibers upwards. In specimens stained with chloride of gold, the dentine is always much deeper in color than the enamel, hence the relations described are very plainly marked on such specimens.

Fig. 11.



Union of dentine with enamel. *D*, dentine; *E*, enamel; *a*, *a*, protoplasmic bodies on the boundary between both tissues, in union with enamel-fibers, *b*, and with dentine-fibers, *c*. Magnified 1200 diameters.

Results.

The details described from microscopic examination make it evident that we shall have to modify considerably the views heretofore maintained on the structure of the teeth.

Since we have known the structure of protoplasm, and that of basis-substance of connective tissue, by the researches of C. Heitzmann, we are accustomed to look for the distribution of the living matter not only in the protoplasmic bodies (the formerly so-called cells), but also in the basis-substance, which, for a long period, was thought to be devoid of life.

Living matter has two main characteristic properties, viz., those of motion and reproduction. We observe contraction and extension alternately in every variety of protoplasmic formation, also the increase in size of living matter (swelling of the granules), both in the physiological process of propagation and in the pathological process of inflammation.

The net-work of living matter present in the basis-substance of connective tissue cannot, as a matter of course, be seen moving, but we observe very readily its increase after the basis-substance has been liquefied and the condition of the protoplasmic stage re-established, as in inflammation and new formations. In all these instances the chloride of gold is a valuable reagent for the purpose of staining the living matter in all its phases of development.

The structure of the tooth closely resembles that of bone. We know that the basis-substance of bone is traversed everywhere by a net-work of living matter, in the shape of beaded fibers, where they form larger offshoots of the protoplasmic bodies. In bone-tissue the presence of living matter is plainly demonstrable by observation of living, and of chromic acid specimens, both in physiological and pathological conditions.

Comparison of the tissues of teeth and bone shows that a tooth, as long as it is in connection with the living organism, is alive, and contains a great amount of living matter. The sensitiveness of all the tissues of the tooth, the phenomena of growth, the results of inflammation, etc., all strongly indicate the presence of living matter within the tooth, and this I have proved in fresh teeth, in those treated with chromic acid and stained with chloride of gold.

1st. The dentinal canaliculi are excavations in the basis-substance of the dentine, each containing in its center a *fiber of living matter.* Besides the dentinal canaliculi, there exists an extremely delicate net-work within the basis-substance of the dentine, into which innumerable offshoots of the dentinal fibers pass. Although we cannot trace the living matter throughout the whole net-work in the basis-substance, evidently owing to its delicacy, we are justified in assuming that not only the dentinal canaliculi, but the whole basis-substance of the dentine is also pierced by a delicate net-work of living matter. The living matter of the dentine is in direct union with that of the protoplasmic bodies of the pulp, of the cementum, and of the enamel.

2d. The cementum, as well as ordinary bone, is provided with lacunæ and canaliculi. The lacunæ contain nucleated protoplasmic bodies, and the canaliculi hold offshoots of the living matter of the protoplasm. The whole basis-substance of the cementum is traversed by a delicate net-work, which in all probability contains living matter, though this is traceable only in its thorn-like projections from the periphery of the protoplasm and its larger offshoots. The living matter of the cementum is uninterruptedly connected with that of the periosteum, and continuous with the living matter of the dentine, either through intervening protoplasmic bodies in the interzonal layer or directly with the dentinal fibers.

3d. The cementum covering the neck of the tooth is devoid of lamellæ and protoplasmic bodies. It is built up by directly ossified osteoblasts of the periosteum, presenting their prismatic shapes, and everywhere traversed by a net-work of living matter. This is in connection either with the epithelium of Nasmyth's layer or the periosteum, and with the dentine mainly through the intervening net-work in the basis-substance of the latter.

4th. The enamel is traversed by fibers of living matter located in the interstices between the enamel-rods. The fibers are connected with each other by delicate fibrillæ, piercing the enamel-rods in a vertical direction. Besides these rectangular unions the basis-substance is traversed by a minute net-work of living matter. The enamel-fibers send conical thorns towards the enamel-rods, and such thorns are visible in all interstices between the enamel-rods. The enamel-fibers are continuous on the outer surface with the covering layer of flat epithelia, and on the inner surface with the dentinal fibers. The latter connection is either direct or indirect through a net-work of living matter, or through intervening protoplasmic bodies in the interzonal layer.

(To be continued.)

WHY DO FILLINGS FAIL? THE ELECTRO-CHEMICAL THEORY OF THE "NEW DEPARTURE" vs. DEFECTIVE MANIPULATION AND DEFECTIVE STRUCTURE.

BY W. H. TRUMAN, D.D.S., PHILADELPHIA, PA.

(Read before the Pennsylvania State Dental Society, at Bedford Springs, August 1st, 1878.)

(Concluded from page 604.)

We are now prepared to examine the theory and practice of the so-called "New Departure," introduced to the profession by Drs. Palmer, Chase, and Flagg, at a meeting of the New York Odontological Society last November (1877). Let us examine closely the evidence upon which it is based, and see if it offers any better explanation of our failures, or promises any better chance of success.

Before accepting their conclusions, we would suggest a careful reading of the many articles on this subject which have appeared in our various journals from time to time. The earliest notice of it we can now recall is found in the *American Journal of Dental Science*, vol. i. (1839) page 86, in a communication by Dr. L. Mackall, of Baltimore, on "The Impropriety of Plugging Teeth with two kinds of Metal in the same Mouth." His attention was called to the injurious effects on the teeth of the galvanic current by Dr. Fonerden, of the same place. The Baltimore editor (Dr. C. A. Harris), in commenting upon it, gives Dr. Fonerden the credit of calling his attention to it six years previously; while Dr. Eleazer Parmly, the New York editor, in his comment, quotes from a work by Thomas Hare, of London, published in 1820, in which attention is called to the same thing. In all these remarks especial stress is laid upon the injurious effect of *tin foil* and *amalgam*, and cases are cited in which both materials were supposed to have caused decay, or severe pain and irritation, by their electro-chemical action; relief being afforded in all cases by removing the tin or amalgam and inserting gold. In another article in the same volume (page 172), on "Galvanic Action of Metals in the Mouth," by Josephus Brockway, attention is called to the injurious effect of combining various metals in constructing artificial dentures,—the platina pins of the teeth, and the gold of the plate. The difference in the carat of the plate and the solder (he claims) converts the mouth into a galvanic battery, and produces very injurious effects upon the remaining natural teeth.

In illustration he cites a case where a gentleman "of sound constitution and good health," who had passed the age when teeth decay rapidly, had two lateral incisors inserted (human teeth), connected by a flattened gold wire, and hooked around neighboring teeth, no solder or any other metal but the gold being used. These were worn with satisfaction about six years, "during which time no symptoms of disease appeared about his other teeth." They were replaced with a more modern appliance,—a gold plate with teeth soldered on. After this was inserted "a most lamentable change took place in the condition of his teeth. They very soon began to exhibit the appearance of teeth in a mouth surcharged with acidity, not unlike what is often seen in the case of a female during gestation, a strong and unconquerable disposition to decay, which it was found impossible to arrest by plugging." In about six years he was wearing five artificial teeth, while several others required plugging. "I state this" (the writer adds) "as being at once a strong and palpable case of galvanic action resulting in the decomposition of teeth. I believe, however, it is a case which has parallels by the thousand." This writer, who claims nearly twenty years' experience, says, in concluding his article, "Pure gold may be used without detriment, either within or around the teeth, provided no other metal be used in the same mouth; and from long observation I give it as my opinion, that while it is objectionable to use gold in filling the front teeth and tin in the back ones, the evil is very trifling compared with the combination of metals as used at present in setting teeth on gold plates." (In his article he names platina, gold, silver, copper, zinc, etc., as found in the pins, the alloyed gold plate, and solder.)

We thus see the supposed incompatibility of filling-materials and dentos was recognized at least as early as 1820, and attention called to it from time to time ever since. Precisely the same effect which the advocates of the New Departure assign as the result of this incompatibility—the generation of a local acid condition in the immediate vicinity of the filling—was noticed by Dr. Fonerden about 1833, and a few years later generally recognized as the cause of a great many failures with *tin foil* and *amalgam.* Many cases are cited from time to time where teeth filled with tin foil, tin foil and gold foil in combination, or amalgam, were giving severe pain, or were being rapidly destroyed by the electric or galvanic action between the metals themselves, or the metals and dentos. In all cases the trouble immediately ceased on inserting gold. The only difference we see in the electro-chemical incompatibility theory of 1833 and that of 1877 is simply this: *the gold and the base metals have changed places.* The arguments advanced then, the cases cited, and the evidence deduced from them, are fully as strong and as much entitled to respect as anything we have heard or read in favor of the later idea.

It may be said that the advances in science which in so many things have revolutionized the theory and practice of the past, enable us to form a clearer and more correct judgment. But does this explain why, from thirty or forty years ago until within a late period, gentlemen of acknowledged intelligence and experience, and who seemed to have understood the electro-chemical relation of metals with each other and with dentos as well as it is understood now, should find amalgam, tin foil, and especially tin foil combined with gold foil, used precisely as it is now recommended to be used, produce such disastrous results; and why men of equal standing to-day find the same metals, used in the same way, act so kindly? The laws of nature have not changed, neither has the old adage, "It is human to err," ceased to be true.

Is it not more probable that the difficulties of the past were due to the improper manipulation of the amalgam, and what we would now term rough treatment of the pulp? From what we read, we infer, that in preparing amalgam too much mercury was left in the compound: it was used too soft; and in hardening considerable shrinkage took place, followed by discoloration and decay. Metals other than gold were mostly used from motive of economy in large cavities; probably in many cases over exposed or nearly exposed pulps or in diseased teeth. The treatment of these conditions was not understood; they had not the appliances, the remedial agents, the oxychlorides, non-irritant cements, etc., we now find so essential. Whenever trouble followed the insertion of a filling, the tooth or the filling (generally the tooth) was immediately removed, and another case of the injurious effect of amalgam, or tin foil, or tin and gold foil combined, entered in the note-book without any further parley or investigation. Just as at the present day, if a dentist hammers a beautiful gold filling in a frail, immature incisor of a child nine years of age, and the operation is followed by death of the pulp, discoloration of the tooth, and loss of the filling by decay around it: or, if he undertakes to make a jeweler's shop of a mouth filled with weak, poorly-nourished teeth, spending perhaps two or three hours malleting in each operation, and succeeds in surrounding them with a layer of tissue broken up and disintegrated by the pressure used in impacting the gold, and leaves the teeth, after a large expenditure of labor, endurance, and cash, in a worse condition than he found them; or, in other words, if a dentist forgets what teeth are, how they are formed, and where they are placed, in his enthusiastic zeal to become a skillful manipulator of gold, and as the result of his ill-directed skill disaster follows his operation, we would likely have reported another instance of the incompatibility of gold and dentos.

If you will gather together your old dental journals and read them over, you may be surprised to find how often the incompatibility theory had been advanced to account for failures. At one time it is *electro-chemical* incompatibility, between the filling-material and dentos; and again it is an *electro-magnetic* incompatibility, between the operator and his patient.

In the remarks of Drs. Chase and Palmer before the Odontological Society, we think sufficient attention was not given to the (electric) non-conducting properties of dentos. The term non-conductor is, of course, only relative; an absolute non-conductor probably does not exist, but so near does ivory or bone approach to it, that it is frequently used as an insulator in electrical apparatus.

We think also that the influence of vitality was far too lightly passed over. Up to the point where chemical agents become destructive to the tissues themselves vitality controls chemical action. The process of nutrition is a beautiful instance of this. We have another in the stomach, containing and resisting for many years the gastric juice, while it is decomposing tissues chemically like itself; the vitality of the living tissue being the only difference between the stomach and the animal food it contains. In cases of sudden death the stomach has been found digested in a few hours by the same chemical agents it had resisted for half a century. The vitality of the teeth is far less than that of the soft parts, but it is still a factor that demands attention. Those who remember the time when natural teeth were mounted on plates, will remember how much more rapidly they were destroyed than teeth in the mouth. The same rule held good there as in filling,—the more accurately they were adjusted to the plate, the less chance for the lodgment of destructive agents, the longer they lasted. If the electro-chemical action in the mouth was one-tenth as destructive as the experiments in the papers referred to lead us to expect them to be, it would be a rare chance for a gold filling to survive; while in practice the loss of gold fillings inserted with judgment and care is comparatively small, and is in due proportion to the difficulties encountered.

If there is in the mouth an electric action between dentos and gold tending to destroy the teeth, why does not the same effect follow the contact of a gold plate? The fact of a plate being worn is presumptive evidence of that condition recognized as favorable to electro chemical action; and yet, laying aside the mechanical effect of bands or plates wearing the teeth, or retaining food, etc., in contact with them, it is entirely inert; even in cases where the acid condition is so marked, a silver plate is destroyed in a few years. I have in mind several mouths that rapidly dissolve silver plates, rapidly oxidize amalgam, and yet retain gold fillings clean and bright with no sign of failure after many years. Why is this? I have never yet seen the lower front teeth affected by the contact of a gold or silver plate retaining back teeth. If the trouble is between gold and dentos, what possible difference can there be between the contact of a gold filling and a gold plate? Occasionally the contact of a gold band and an amalgam or tin filling gives pain. I have several patients where the contact of a steel instrument on either a gold or amalgam filling has the same effect. I have in their mouths fillings of gold, amalgam, and tin, and during the ten or twelve years they have been in my charge I have seen nothing to indicate any injury from galvanic action. For more than twenty years I have been making silver plates with gold bands, and have had repeated opportunities of examining them after many years of service, and have failed to find any evidence of galvanic action.

I have frequently patched gold fillings with amalgam, as has been done in these specimens which have seen some years' service. We have here gold and amalgam in actual contact, forming a far more active galvanic battery than is claimed for gold and dentos. I see no evidence of harm having resulted to the fillings, nor was any seen about the teeth. These fillings were dislodged by violence while they were preserving the teeth well.

Dr. Flagg seems to approve of this practice; but why, when he thinks gold and dentos such a *bad* combination, he joins amalgam and gold,—they being more likely to cause galvanic action,—he does not explain. Probably, in his enthusiasm, it slipped his mind, as many other things must have done while he was preparing that paper.

It is much to be regretted that Dr. Flagg should have dismissed the experiments he refers to so curtly. It would have been some satisfaction, at least to those who might choose to study the subject, to know more of them than the simple fact that not only were they negative, so far as furnishing any evidence of the existence of an electric current between gold and dentos, but they also proved that another series of experiments upon which the advocates of the New Departure founded their theory were "utterly worthless and without any scientific basis." (Strange! After such an elaborate series of experiments, so ably conducted, so absolutely negative in spite of Professor Morton's kindly-worded caution, that Dr. Flagg still holds that gold *must* be the worst material to use, because of its electric relations to dentos. Strange, very strange!)

Having to mark out our own course in experimenting on this subject, and laboring under many disadvantages for want of apparatus, etc., we simply lay them before you with the conclusion drawn from them.

Our first effort was to see the probable effect of an electro-chemical action such as the New Departure theory supposes. We prepared zinc copies of a central tooth, in some inserting a piece of copper wire to represent a gold filling; these were placed in a weak solution of sulphuric acid. We had here nearly the same conditions supposed to exist in the mouth: a substance acted upon chemically in the presence of a good conductor itself unattacked. In an acid solution so weak zinc alone was not perceptibly affected, the zinc and copper was freely attacked, the chemical action going on much more rapidly around the copper rivet, but not confined to that spot. I show you the two zinc teeth, one with and the other without the copper rivet. They were kept side by side during the experiments, equally exposed to the acid. The zinc alone has scarcely lost its polish, while that with the copper is much roughened all over, but especially around the rivet. I also show you two others for comparison, prepared in the same manner, but not exposed to the acid. In order to measure the relative action on the two teeth, we had made some glass tubes, one-eighth of an inch in diameter and six inches long, closed at one end and funnel-shaped at the other. These were filled with water and inverted over the zinc teeth, so that the hydrogen given off during the action of the acid could be collected and measured. On repeated trials it was found that the stronger the acid, the more energetic the chemical action, the less the difference noticed between that with copper and that without. When the action was rapid there was about ten volumes of hydrogen collected over the zinc and copper to one from the other. When the action was so far reduced that it took about an hour to collect a small bubble of hydrogen from the zinc, the action on the zinc and copper was three hundred (300) times more rapid. With the weak acid the action was almost entirely confined to the immediate vicinity of the copper, but from the fact of the zinc being roughened all over while the other is not, although equally exposed to the same corroding agents, we infer that the action of the electric current produced some change in the electric condition of the zinc, which caused the acid to act upon it more rapidly. The principal points of interest are, the zinc was corroded *deeply* at the point where the copper and zinc came in contact, or at the margins of the filling; and the more feeble the chemical action the more closely is the action of the destructive agent confined to this spot. We now went a step further and substituted dentos for zinc; selecting a number of natural teeth as nearly alike in character as possible, inserting in them fillings of various materials, and submitting them to the action of various acids of different degrees of strength; varying the time of exposure from a few minutes to three weeks; sometimes in separate vessels and at others in the same, and comparing the effect with teeth that were not filled.

The teeth used in these experiments were all perfectly sound, and were mostly selected from a large collection obtained from a dissecting-room; they had been well preserved in alcohol, probably a number of years. A few were recently extracted from the living patient, and these I watched closely, but noticed no difference in their behavior during the experiments. The fillings were of gold, gold and tin, gold and amalgam, tin, gutta-percha, and various makes of oxychloride. In no case was I able to notice any difference in the action of the destructive agent on the filled teeth and those not filled. In every case the action was general over the entire surface of the tooth. There was not in any case the slightest appearance around the margin of the filling like that seen around the copper rivet in the zinc. It was remarked, in the discussion before the Odontological Society, that a piece of gold foil loosely rolled up and placed in a cavity of decay would cause the decay to progress more rapidly. In a number of experiments this was done,—a hole drilled in the tooth represented the cavity, and although the gold was placed in loosely, it protected the cavity in a great measure, the acid not acting so deeply inside the cavity as it did outside. I am aware that these experiments do not represent the actual condition of affairs in the mouth. We may suppose the mouth to be a battery with a single solution, say, for instance, a Callaud cell. The solution in this case is copper sulphate. Zinc is not attacked by the solution of copper sulphate until the copper plate is placed in position and connected with it. Then the salt is decomposed, the copper deposited on the copper plate, and the sulphuric acid set free to act upon the zinc. A similar action is supposed to take place in the mouth,—the destructive agent being set free by the decomposition of some compound or compounds in the secretions. We can have no agents set free in the mouth that will make a better solution than the acids I have used. If they have failed to develop a current or to show evidence of electric action, can we reasonably expect a weaker solution, or one less able to conduct the electric current, to do more? There are many practical difficulties developed in these experiments. There is a very great difference in the behavior of teeth when placed in the acid solution. Some are acted upon rapidly, others slowly. The effect of mineral acids on the enamel is more nearly alike than the same acids on the dentine. The organic acids act more slowly, and relatively more on the cementum and dentine, and less on the enamel than the mineral acids. Those teeth we recognize as being more liable to decay suffer most; but there is a great difference in the resistance of teeth apparently alike in structure and character; so great a difference as to make experiments in this direction difficult and tedious, and the results uncertain. We notice this in using aniline; the enamel was stained only in places where it evidently at some time had been injured, and these places could not be discovered before staining. The cementum and dentine were usually stained to a greater or less degree if left in long enough; a short exposure stained some deeply and others were unaffected. I was unable to see anything to account for this.

While I have seen nothing to indicate the existence of any electrochemical action between a filling and the tooth, I have seen, in examining a subject like this, how easily a different result might be reached by neglecting proper precaution. The experiments referred to by Dr. Henry S. Chase—using a plate of gold or one of tin, or the polished steel plate—are no indication of what takes place in the mouth. Both his plates and his solutions are good conductors; in the mouth the dentos and the saliva or exciting solution are both very poor conductors. The experiments with blocks of ivory would be more to the point if the ivory was replaced with natural teeth. We may sum the matter up by saying that, just as it is impossible to produce in the laboratory by any artificial means that peculiar destructive action on the teeth we term decay, in the same degree is it impossible by experiments in the laboratory to trace accurately the effect of destructive agents in the mouth.

If we confine ourselves to the mouth we see many things which this theory will not explain. I show you several instances where gold fillings in excellent condition have new cavities in close proximity, almost in contact, and yet their margins are intact. The destructive agent in these cases has certainly been in contact with the gold filling, and according to this theory should have caused decay around it, but instead of doing so has attacked the tooth at a new place. I show you on a card four teeth, one with a gold filling, another with amalgam, another gutta-percha, and another with a cavity that has never been filled,—the first three with extensive decay around the fillings. What reason have we to suppose the cause of the decay around these fillings is any different from that which caused the original cavity? We have here what Dr. Flagg calls the best and the worst material to put into a tooth, and both have equally failed. In the mouth from which the tooth with gutta-percha was extracted are a number of gold fillings doing excellent service. We see nothing in this revival of the incompatibility theory that leads us to think differently of it than we do of the ideas advanced by Drs. Fonerden and Brockway in 1833 and 1839. They are all attempts to assign effects in the mouth to causes seen at work out of the mouth, without due regard to the changed condition. The materials proposed in the place of gold will, no doubt, as Dr. Flagg suggests, amply repay by increased durability any extra care in their preparation and insertion, but they all have inherent defects that must be overcome before they can be called reliable. They have their place, and probably have not been used as much as they might. We have never seen the necessity for the long, tedious, painful operation in gold Dr. Flagg speaks of, and, as we have remarked on former occasions,* consider them due to the abuse of cohesive gold, and the neglect of more reliable and expeditious methods. Gold has been used too long, and with too much success, to be abandoned before a better method is at hand. We would ask every professional brother before accepting the teaching and adopting the practice of this New Departure, to reflect a moment on the past, and see how often these tidal waves have swept over the profession. At one time it is arsenic, at another amalgam; twice sponge gold has rolled over us, leaving many an aching void; and no doubt the indiscriminate use of the mallet and cohesive gold, the reckless building up of teeth without regard to their position or character, has done much to secure this idea the warm reception it has met.

"Make haste slowly," dear brother; be very sure the fault is *not in you*, before cutting loose from this faithful, well-tried friend, and risking your reputation on the uncertain ground of plastic fillings.

AMALGAM FOR TOOTH-FILLING.

BY D. VAN DENBURGH, SAN FRANCISCO.

I HAVE had a long experience with amalgam, and my opinions of it are based upon that experience. I was educated in the Parmly, Harris, and Westcott school of opinion that amalgam had been, and must continue to be, an unfit material for tooth-filling; and my use of it began in little faith or hope that it would prove serviceable in my practice. It may be inferred, then, if it has won a place of usefulness with me, that it has done so on its own merits. Many of my own teeth were filled by C. A. Harris, of Baltimore, thirty years ago. A few more in the half-dozen succeeding years were filled by Amos Westcott, of Syracuse, N. Y. One alone of these fillings failed, and that repeatedly within the first half-dozen years. I would not have the tooth extracted, as advised; and, after having the decay excavated, I prepared a putty of tin, silver, and quicksilver, and myself placed it in the cavity of the unfortunate lower molar tooth. For more than twenty years it has done me as good service as its brighter neighbors. But the point of interest is, that it has done this where gold skillfully used had failed. After a year or two of good conduct by this amalgam filling, I began to feel some interest in it, and in various ways in my laboratory to test some amalgam mixtures.

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* DENTAL COSMOS, vol. x. (1868) page 128 Dental Times, vol. x. (1872) page 49.

I occasionally filled in some mouths (where I might have opportunities afterwards to watch it) some dilapidated tooth that would otherwise have been extracted, some soft or poorly cared for teeth that fillings of any kind were least likely to preserve, and some difficult cavities that were hard to fill satisfactorily with gold. With such a beginning I went on experimenting, testing, and comparing, and now, after twenty years, I still use it, and nearly as often as I use gold.

Now let me state my opinions and such facts and reasons as have helped to form them. The amalgam mixture I think best is composed of coin silver, four parts; tin, five parts; and mercury, *q. s.* If tin and quicksilver be mixed to form a putty, the mass will become puffy and enlarged in the slight hardening process that will occur. If silver be mixed with quicksilver in a similar way, they will form a pretty hard mass, but a contraction will occur in the hardening process. A proper proportion of tin may, therefore, exactly counteract the shrinking of the silver and quicksilver, and form a mass sufficiently hard to resist mastication. The copper in the coin adds to the hardness and solidity of the amalgam. The oxidation to which amalgam fillings are liable depends upon the baser metals, and nothing is gained by substituting gold or any other metal for the coin silver. A little gold dissolved in the quicksilver seems to give to the amalgam a finer grain and smoother working qualities; but I cannot say that it adds to its practical value. The preparation should be accurate. No more heat should be used than is necessary to make the coin and the tin each fluid in separate crucibles. The one with the tin should be large enough to hold twice the quantity of both metals, so that when the molten silver is poured into the tin the whole may be stirred vigorously with a pointed stick. It should then be cast in thin ingots suitable for filing. It is easy to injure the mixture. I have often received it unfit for use when prepared for me by metal workers. The amalgamation of the filings is also a matter of particular care and skill.

As this must be done within five minutes of its use, and as we cannot measure the exact proportions that should form the filling, practical skill and judgment can alone guide us. My method is, with the filings in the palm of my hand, to mix a superabundance of quicksilver, so that the mass may be semi-fluid. It is then washed with alcohol until no longer discolored; then the superabundant quicksilver is pressed out by twisting in the corner of a napkin all that one can readily exclude with the fingers. It is now ready for the prepared cavity, where it may be carefully packed with gentle pressure, making sure to press it into all the corners with as small points as convenient. A well-prepared amalgam filling, when just pressed into a tooth and rubbed with a burnisher, should show a slight "flushing" with liquid quicksilver. The alcohol washing I regard as important. The union of the quicksilver with the filings is practically the process of melting, producing much dross or oxidation. The object in using a superabundance of quicksilver is, to favor the separation of these oxides, and also to cause a thorough saturation of the filings with the quicksilver, which is necessary to produce an undisturbed and uniform hardening. As under such circumstances alcohol will not penetrate or "wet" the mass, there can be no difficulty in getting it dry, as some have imagined.

If a glass tube with an even and smooth surface be stopped at one end with such an amalgam, it will be found, when hardened, firmly fixed in its place, and that it cannot be made to leak if a liquid be placed over it under pressure. It fulfills the requirements of a strong, solid, and tight filling.

When new the color of amalgam fillings is perhaps less objectionable than that of any other material with which teeth are filled. Occasionally the discoloration is very slight even with long time. Generally they tarnish to such an extent that the contrast in color is as great between them and the teeth as that between gold and enamel, and more unpleasing to the eye. Yet, where a large filling must protrude from a broken tooth, if kept clean by mastication and brushing, it may be a matter of taste whether gold or amalgam is preferable in appearance.

The surfaces of an amalgam filling in contact with the walls of the cavity may often be found, after it has been some time in place, more or less discolored. This ought not to occur from a leakage of saliva about the filling into the cavity. In good operations it does not come from this cause. It may be caused by an exudation from the broken tubuli of the dentine, acting for a time corrosively upon the metal; but this is so slight as to produce no material injury to the filling; while, on the other hand, I am deceived if its effect is not at times (and it is most perceived in soft teeth) to produce a remedial agent, as lead has been supposed to do under fillings, that acts favorably in reducing the excited and sensitive condition of the dentine, and helps to heal and harden it, and bring the tooth into a better condition to resist decay.

In the earlier years of my use of amalgam I thought I occasionally observed so much superficial oxidation as, after a considerable time, to injure the edges of certain fillings, and produce a crevice that favored the renewal of decay; but longer experience has taught me that the fault was my own in unskillful preparation and use of the material. I believe now that amalgam will resist all destructive agents in the mouth as well as any dentine or enamel can do, but a caution may be necessary to the inexperienced, not to use so much or so little quicksilver as to make it crumble under mastication; or to attempt to use the mixture in any case after it may be perceived that the hardening process has begun. If this process be once interfered with, though it will be renewed in a degree, no reliance can be placed upon the mixture. A good amalgam filling will not stain any tooth. That anything hurtful to the most delicate or diseased organization can be found in it, or produced from it in the mouth, seems to me the most fanciful nonsense. Any quantity of the metal that might be placed in the mouth, would not probably lose by trituration or chemical action a perceptible amount of any or all of its ingredients in a lifetime; and even if such loss were to occur in any way or form, I know of no reason to suppose that it would be hurtful if taken into the stomach; much more likely, indeed, if medical practice is correct, to be beneficial.

Cases have occurred where two fillings in the same tooth, of different metals in contact with each other and with the saliva, have produced an electric action destructive to the substance of one filling, and painful in its effect upon the tooth; but there is no need of, and no propriety in, permitting such conditions, though they might exist in a thousand cases without one being hurtful.

I have had a business connection that has made me familiar with the operations of most of the acknowledged best dentists of this country and of Europe, who have worked in the last quarter of a century, that has given me abundant opportunities for observation and comparison, and I believe that in any case as useful and durable a tooth-filling may be made with amalgam as with gold. Amalgam is easy of application, but the skill and judgment required in its preparation and use are not more easily attained than first-rate skill in the use of gold.

The use of amalgam affords no plea for unskillfulness or inefficiency. I might repeat many cases from my records illustrative of the particular merits I claim for amalgam; but I do not think the recital of particular cases can much influence those who have not witnessed their conditions and results.

To the dentist much time may be saved by the use of amalgam, but in this respect, and in avoiding the often severe inflictions of modern ways and appliances for filling teeth with gold, the patient, where amalgam takes its place, will have most reason to rejoice. Five minutes are sufficient to insert any amalgam filling, and nothing more is required to keep the work dry than a napkin or a roll of paper. But not only am I convinced that amalgam, in respect to usefulness and durability, may in any case be as good as gold; I am equally certain that in some cases it is superior, and for the reason I have mentioned, of its more kindly contact and healing qualities in connection with soft dentine. As a mechanical stopping, where a tooth is much weakened by the loss of substance, amalgam brings no strain as gold does; on the contrary, it becomes a binding and supporting protection. Much of the solid substance of teeth is often cut away to secure the better insertion of gold that would be unnecessary for amalgam. Any one with strong masticating organs can "chew up" a gold coin; so, the most perfect gold filling, when made a projecting portion of a tooth, and subjected to severe mastication, will spread and finally break away. Amalgam has a greater power of resistance, and in many such cases will prove the most serviceable grinder. I suspect the prejudice against amalgam is based upon other grounds than a knowledge of its merits or demerits. Something remains perhaps of the memory of former battles between dentists, in which the old quicksilver compound under this name was made one of the war cries, and, though it deserved a bad name, was doubtless blamed for what it never did. Something is due to the vanity not uncommonly connected with skill in the use of gold, to acquire which seems to have absorbed the chief energies of a portion of our profession for the past twenty years, and which after all has failed in conferring the professional dignity and usefulness that are laudable desires. We shall do better, I think, when a broader knowledge is joined to our skill, and when we can do more to make our operative skill less frequently necessary.

CLINICAL REPORTS.

PHILADELPHIA DENTAL COLLEGE, DEPARTMENT OF ORAL SURGERY.

Clinical Service of Prof. J. E. Garretson, M.D.

Gentlemen: I bring before you this morning a remarkably peculiar palatine defect. Looking into the mouth of the patient, you see that this man has no soft palate; the tissues of the location being continuous with those of the fauces. This peculiarity is not of congenital origin, but comes of injuries received in wrestling with Venus. So great and varied are the expressions of an inflammation that must have been of the severest character that I find myself quite at a loss as to the adoption of a course of treatment for the patient's relief. What the man asks to have done is to close the oval break that you notice back in the throat. The trouble arising out of this break, as eating and drinking are concerned, is complained of as being very great. After eating, as he tells me, quantities of food which have been forced through the break have to be gotten out of the nose. In drinking, he has to depend on gravity and position for getting the fluid into his stomach.

To close up this opening is not, however, a matter to be thought of. It is through this hole that the man breathes, and that the nostrils cleanse themselves. The hole is the passage-way to the throat of the secretions of the lachrymal gland, and of the antrum of Highmore. The best thing, I think, we can do is to hold the case under consideration. We will therefore dismiss the patient subject to call, when we succeed in making up our mind as to what is best to be done. I will ask the class to assist me in coming to a conclusion, and will hear with pleasure any suggestion.

THE NEXT CASE is one very interesting from an operative standpoint; it involves too the question of life. The gentleman before you is one of my private patients, who, for your instruction, is kind enough to permit an operation to be done in your presence. Casting your eyes upon the nose you remark a disease which, on a former occasion, I explained to you under the name of epithelioma; one of the many expressions of the cancer-vice. The disease here situated upon the nose is precisely the same as the one referred to situated upon the lip. By many, epithelioma is considered as a purely local disease; by many others it is esteemed as the expression of constitutional vice named. Just now we will not enter into this question of difference. On a future occasion I shall have much to say upon it. At the present time I enjoy, and for the past seven years I have been enjoying, a state of self-congratulation about a supposed discovery in the way of a radical cure for this threatening evil. I have come to believe that a cure for it is found in removing very radically the diseased part, and in replacing the part removed by tissue brought from neighboring parts,—the farther away the better.

Having the patient now very profoundly under the influence of ether, I proceed to remove all the portion of the nose involved. . . . You will accept that this has been pretty thoroughly accomplished. . . . I take my time, for the reason that I want all bleeding to stop, and desire to see covering the face of the wound a film of plastic exudate. . . . The drawing I am making over the gentleman's forehead is with a view to securing material for the making over of the lost part. . . . I have now a flap marked out. The base of this flap takes up the supra-orbital artery; the other end lies at the hair-line. What I want to do is to put the part of the scalp which lies along the hair-line into the place from which I have just removed the tissue of the nose. I further want to get the skin which adjoins the nose wound towards the forehead up into the place of the flap now being dissected.

As we go on with the necessary cuttings, I wish you to observe how much the work resembles that done in a dissecting-room. The patient lies not less without feeling than does a cadaver. The anæsthetic, which we are using freely, does no harm. Why should we not take our time and be sure that the operation is done to complete satisfaction? . . . The flap is now raised. Leaving it also to gloss, I arrange for transference the intermediate tissue. . . . This, too, is now accomplished, and the last stage is to relate the parts to the positions for which the dissections design them.

[Dr. Garretson here proceeded to arrange the flaps according to the design of his cuts, using for the purpose three harelip pins and some thirty sutures. When completed, the parts were found fitted with almost the accuracy of mosaic work, eliciting enthusiastic commendation from the professional men and students who had watched the progress of the operation.]

OUR NEXT CASE is also one of epithelioma. The tumor involves the lower lip of this old man. Men, old men, are the commonest subjects of epithelioma. This patient thinks his trouble had its origin in Paris green used by him for the purpose of killing potato-bugs. In this, however, he is wrong. Epithelioma is not to be easily mistaken for an inflammatory tumor of any such origin. Epithelioma, that is, epithelioma of cancerous nature, shows peculiarities of structure that need no microscope for their exhibition. The disease here seen by you is epithelioma of cancerous character; the only hope for the patient, known to science, is the knife.

It is greatly to the profit of this old man that the disease has gathered itself into the egg form that you see. Please notice particularly that the tumor possesses the expression of concentration. Such expression affords the largest latitude of promise. I have great hopes for this patient, certainly his chance is many, many times better than if the growth was of an infiltrated kind. Infiltration is only one remove from death sentence. When you cannot see the boundaries of an epithelioma you need not expect good from an operation.

[The lip was here removed, and the patient, after the dressing, was taken away by the physician under whose care he had come.]

Our next case is this of an anchylosed jaw. You could scarcely, I think, imagine anything in its way more unpromising in appearance. This young woman has not had her mouth open since childhood. The cause of this fixedness is traced to a compound fracture. To eat implies a process of putting the mouth into a basin containing fluid food, and sucking the contents through the interspaces of the teeth. A condition more lamentable is scarcely to be imagined.

Now, as to the question of cure, can we do anything for the relief of the patient?

Diagnosis is much involved in the answer to such a question. Is the anchylosis true or false? Does the fixedness exist in bony union of the condyles of the inferior maxillary bone with the glenoid cavities of the temporal bones, or is the trouble in the way of fibrous adhesions external to the articular cavities? To find correct replies to these questions is our first step. Bony anchylosis is an immovable anchylosis. Fibrous bands causing fixedness will yield more or less to traction. . . . Professor Dorr having kindly prepared these wedges for me, I proceed, with his assistance and that of my worthy clinical assistant, Dr. Ayer, to make a test. . . .

Look now at the movement. Already the patient separates the teeth widely enough to permit us to see her tongue between the arches. It has been hard work to gain this much, as you are prepared to bear witness, but in gaining this we have secured what is of infinitely more consequence, both to surgeon and patient; namely, the diagnosis of false anchylosis.

[Dr. Garretson consumed the rest of the hour in a continued treatment of the case, conjoined with clinical remarks on the subject.]

PROCEEDINGS OF DENTAL SOCIETIES.

AMERICAN DENTAL ASSOCIATION.—EIGHTEENTH ANNUAL SESSION.

Fourth Day—*Morning Session.*

The association was called to order at the usual time. The larger part of this session was taken up in the reading of several very lengthy papers, to a degree in excess of any previous meeting. The subject of Therapeutics was taken up, and Dr. F. M. Odell, the chairman of the committee, read a long report, which was strictly medical in its character, and related almost exclusively to the treatment of fevers, and the method the author had followed in his own case. He considered that a departure from the normal temperature of the body (98.4° to 99.5°) in either direction indicated a diseased condition.

He regarded the thermometer as an important aid in the treatment of diseases and to the diagnosis of the changes taking place. Animal heat is the product of the physiological changes taking place in the body,—digestion, assimilation, secretion and excretion. The dispersion of an excessive degree of heat may be effected by stimulation of the sudorific glands, by increasing the respiration, and by various other agencies.

The subject being open for discussion,

Dr. Spalding called attention to an important therapeutic agent in fevers which was omitted in the report, viz., gelsemium sempervirens. He considered it the best remedy for general inflammation, as aconite was for local.

Dr. Flagg. Gelsemium is one of those ticklish remedies to use, like hydrate of chloral, and should be used with caution.

Dr. Atkinson. We should know how and why remedies act. Until we can tell this, we are shooting at clouds. We should know what constitutes derangement, and how medicines administered produce favorable or unfavorable results. He defies any therapeutist to show how even a dual agent acts. He has seen a prescription containing twenty ingredients; often they have fifteen. Therapeutic action is re-establishing normal activity, and the agent acts in three ways. One is by the inducement of tonicity, a proper nerve-current in the vaso-motor system, which polarizes the protoplasmic mass, and produces motion of the molecular mass and its constituent atoms. Another way is by the stimulation of adjoining territories by the class of remedies called adjuvants. Another mode is by the use of agents which shut out further malign presence. There is only one kind of fever, and it differs only in degree. We hear of "sthenic fever," which is sheer nonsense, and means strong weakness. There is no sthenic disease; all diseases are asthenic. Food elements reduced to acids and alkalies neutralize each other. Too much acid causes what is called typhoid fever. Drunkards do not die right off, because they are stuffed with hydrocarbons, so that the oxygen does not operate on the pabulum in the tissues.

The speaker desired to present two therapeutic agents, one of which was new, and the other not. The latter was salicylic acid, which he considered would do anything that creasote would do, and without stain. He would dust it on ulcerative or pus-producing surfaces; it would instantly remove aphthous patches, and cure irritated spots under plates. There was no escharotic effect if there was no excess. He advised touching every cavity with a saturated alcoholic solution of salicylic acid before filling. The other agent, boracic acid, is one known in chemistry, but little known in medicine. It takes the place of permanganate of potassium, which stains badly. It is not escharotic; the foul places should be sopped out with a saturated solution in water, which will leave no stain.

Operative Dentistry was then taken up, and Dr. M. H. Webb read a report on that subject, which was very lengthy, minute, and comprehensive. The author's favorite methods were advocated. He does not believe in permanent separation of teeth; uses light foil principally, and the electro-magnetic mallet, which he claims can be guided as easily as a pen. He would apply the rubber dam in all cases; if clamps are used, he would put them on first, and put the dam on over them. He would under-cut cavities just inside the line of the enamel, but not at the cervical margin. He separates by means of wood or linen tape, and keeps apart with gutta-percha till the soreness subsides. He would not use burnishers upon gold at all. He believes in fully restoring the contour in all cases. He would conceal fillings when practicable, but when exposed to view they should be finely finished. When the cervical margin of the cavity is at the edge of the gum, the cavity should be extended above, so that the gum will cover the border of the gold. The treatment of exposed pulps, and of teeth having dead pulps, was fully detailed; pulp-chambers he would fill with gold.

The Committee on Volunteer Papers reported that they had three papers in this department which they deemed worthy to be read, by Drs. Flagg, Friedrichs, and D. D. Smith. The latter paper was first read. This was mainly devoted to the advocacy of the use of oxychloride of zinc as a filling-material. He claimed that by its use the dentine is hardened and rendered less susceptible to destructive influences. He fills the cavity full at first, and after a time cuts away a portion and fills with gold.

Dr. J. Foster Flagg then read his paper, entitled "Plastic Fillings as a Power in Dentistry." [This paper appeared in full in the September number of the Dental Cosmos.]

Dr. Friedrichs also read a paper, in which he discussed the asserted necessity of keeping a cavity dry during the operation of filling. He cited cases where he had successfully filled a tooth under saliva.

The remainder of the morning session was occupied by the reading of a lengthy volunteer paper, by Dr. C. S. Stockton, of Newark, entitled "Failures," which showed an extensive reading on the part of the author, embodying quotations from and allusions to a large proportion of contemporaneous literature.

At the conclusion of the reading of this paper the association adjourned.

Afternoon Session.

The first business in order was the re-opening of the discussion upon which so much time was fruitlessly spent previously, upon a motion to take the subject of the engraved certificate of membership from the table and insert the word "honorary" in the plate.

Dr. Barrett did not approve of tabling the matter, but thought it improper to take advantage of the present small attendance to push the matter through. The previous question was ordered, and the motion was carried.

The proper authorities were authorized to procure a seal for the use of the association.

A motion was made that the discussions in regard to the certificate on yesterday be stricken from the records, but the mover being assured by the secretary that he had made no report of the remarks, the motion was withdrawn.

The newly-elected officers were then duly installed, and the retiring and incoming presidents each made brief and appropriate remarks.

The regular order was resumed, and a report on Chemistry, by Dr. Noel, of Nashville, was read by Dr. Cushing. This paper treated of the destructive character of sugar upon the teeth, and presented suggestions in regard to the conclusions to be drawn therefrom. It also discussed and took exceptions to the assertion that sulphuric and nitric acids are generated by the putrefaction of meat between the teeth, and took the ground that the greater amount of dental decay arises from the decomposition of saccharine and starchy substances in the mouth.

The subject was passed without discussion.

Dr. C. D. Cook, chairman of the Committee on Literature, read a somewhat lengthy report, in which he criticised the various publications, both foreign and domestic, and their relation to the profession.

Some discussions ensued upon the report. The organization of the Sections was then proceeded with, the results of which we have already given.

The special committee to whom was referred the proposed amendment to the constitution offered by Dr. Hawxhurst relative to dental colleges, reported that they did not deem it expedient that such an amendment should pass at this time, but they offered the following for adoption, which was carried:

Resolved, That this association disapprove of the practice of dental colleges in graduating upon less than two full courses of lectures, and believe it to be detrimental to the interests of dental education, and advise the omission of such inducements from their annual announcements.

A committee was ordered to revise, engross, and reprint the constitution and standing resolutions.

The committee to prepare resolutions on the death of the late Prof. Barker presented the following report, which was adopted, and the resolutions ordered printed on a memorial page in the Transactions:

Whereas, In the wisdom of Divine Providence, our colleague, Professor George T. Barker, vice-president of this association, has been removed by death from our midst, in the prime of his manhood; therefore,

Resolved, That we feel called upon to testify, in this manner, our appreciation of his usefulness as a member of our profession.

Resolved, That we deplore his loss, and regard his example, both professional and social, as eminently worthy of emulation.

Resolved, That the sympathy of the members of this association be and hereby is tendered to the bereaved family of our lamented brother.

Resolved, That the above testimonial be inserted in the minutes of this association and printed on a memorial page in the annual Transactions.

J. Taft,
F. J. S. Gorgas,
G. H. Cushing,
T. L. Buckingham,
Committee.

Drs. Crouse and Keely were named as the Committee on Publication.

After the usual closing business, resolutions of thanks, etc., the association adjourned to meet at Niagara Falls on the first Tuesday of August, 1879.

CONNECTICUT VALLEY DENTAL ASSOCIATION.

The annual meeting of the Connecticut Valley Dental Association was held at Springfield, Mass., October 22d and 23d, 1878. The following were elected officers for the ensuing year:

President.—Dr. C. A. Brackett, Newport, R. I.

Vice-Presidents.—Drs. C. S. Hurlbut, Springfield, Mass., and C. Fones, Bridgeport, Conn.

Secretary.—Dr. C. T. Stockwell, Springfield, Mass.

Treasurer.—Dr. Newton Morgan, Springfield, Mass.

Executive Committee.—Drs. P. H. Derby, Springfield, Mass.; J. N. Davenport, Northampton, Mass.; and James McManus, Hartford, Conn.

The president, secretary, and executive committee were constituted a committee to arrange for the June meeting at Boston, to which all the New England associations have been invited by the Massachusetts Dental Association.

C. T. Stockwell, *Secretary.*

MASSACHUSETTS DENTAL SOCIETY.

The fourteenth annual meeting of the Massachusetts Dental Society will be held at the Tremont House, Boston, on Thursday and Friday, December 12th and 13th, 1878. All reputable members of the profession are cordially invited to be present and join the society.

Dwight M. Clapp, *Recording Secretary.*

BROOKLYN DENTAL SOCIETY.

The eleventh annual session of this society was held October 14th, 1878. The following officers were elected for the ensuing year:

President.—Dr. C. D. Cooke.
Vice-President.—Dr. A. N. Chapman.
Recording Secretary.—Dr. C. P. Crandell.
Corresponding Secretary.—Dr. W. H. Atkinson.
Treasurer.—Dr. W. A. Campbell.
Librarian.—Dr. C. E. Mensch.

C. P. Crandell, *Recording Secretary.*

MERRIMACK VALLEY DENTAL ASSOCIATION.

At the sixteenth annual meeting of the Merrimack Valley Dental Association, held at Lowell, Massachusetts, November 7th, the following gentlemen were elected officers for the ensuing year:

President.—Dr. I. J. Wetherbee, of Boston, Massachusetts.
1*st Vice-President.*—Dr. T. H. Chandler, of Boston, Massachusetts.
2*d Vice-President.*—Dr. C. H. Osgood, of Boston, Massachusetts.
Secretary.—Dr. H. W. Coburn, of Lowell, Massachusetts.
Treasurer.—Dr. G. A. Gerry, of Lowell, Massachusetts.
Librarian.—Dr. G. F. Waters, of Boston, Massachusetts.

Executive Committee.—Dr. L. D. Shepard, of Boston; Dr. R. R. Andrews, of Cambridge, Massachusetts; Dr. J. P. Dennett, of Gloucester; Dr. J. Guttman, Great Falls, New Hampshire; Dr. A. M. Dudley, of Salem, Massachusetts.

H. W. Coburn, *Secretary.*

BIBLIOGRAPHICAL.

Treatise on Dental Caries. Experimental and Therapeutic Investigations. By Dr. E. Magitot, Laureate of the Institute of France, of the Faculty and the Academy of Medicine of Paris; Correspondent of the Odontological Society of London, of the American Dental Association, etc. Translated by Thomas H. Chandler, D.M.D., Professor of Mechanical Dentistry, and Dean of the Dental School of Harvard University. Illustrated. Octavo, pp. viii, 275. Boston: Houghton, Osgood & Co., 1878.

Every dentist ought to be more or less a pathologist. Caries of the teeth—the disease which oftener than any other he is called upon to combat—is a pathological condition. Its etiology, its symptomatology, progress, and complications; its nosology, diagnosis, and treatment, are the problems which it is the especial duty of the dentist to investigate. These are the questions which in the volume before us the author has essayed to solve. A careful observer and intelligent experimenter, he has endeavored to present an explanation of the relations of cause and effect; the reaction between external agents and the physical organisms, and to illustrate by experiments outside of the vital processes the chemical relations concerned.

The desire for a better appreciation of the pathology of dental caries, and the dissatisfaction with mere manipulative skill in its treatment, is illustrated in this scholarly and scientific contribution to the literature of the subject.

The author assumes that the teeth are special organs, and, though subject to general laws, that they are subject also to special lesions, because of their exposure to physical and chemical influences. A comprehension of their pathology presupposes a knowledge of their normal constitution and of the conditions under which the lesions occur, including anatomical predispositions, such as vices of conformation; external and internal defects, the recognition of the destructive agent, its mode of formation, its chemical characteristics, and its greater or less effect upon the teeth, depending upon diverse influences, and also upon a certain vital resistance of the organs themselves. He describes the variable progress of caries, its frequent temporary suspension, its occasional complete spontaneous arrest after a veritable contest, which indicates the methods which may be pursued by art with definite and satisfactory results. He reviews the several doctrines of the causation of caries, and announces his own, which is that caries is a purely chemical lesion, resulting from the presence of an acid in the mouth; not the secretion of any particular gland, but the mixed buccal fluid composed of substances found in the mouth, either spontaneously developed or accidentally introduced. These positions are discussed at length, and illustrated by the record of varied experimentation. From the stand-point thus arrived at he suggests the therapeutic measures applicable to the different varieties of the lesion, and its rational, complete, and definite cure.

The conclusions to which the author has been led are tersely summed up at the close of the volume in twenty-eight aphoristic statements, which will be found in the Periscopic department of this issue of the DENTAL COSMOS.

Some twenty wood-cuts illustrate the work. Appended are two plates, with explanatory letter-press, showing by fifteen illustrations the "Anatomic Lesions of Dental Caries;" also a chart of the geographical distribution of dental caries in France.

The book is entitled to the careful study of every dentist, as the subject of which it treats is nowhere else so systematically handled.

But while thus inviting attention to the author's earnest effort to elucidate the topics discussed in this volume, we do not mean to be understood as accepting all of his conclusions, and shall probably at a future time take occasion to point out what we consider unsatisfactory and erroneous.

The translation has been faithfully performed by Dr. Chandler, to whom the profession in America owe a debt of gratitude for this labor.

The book is strikingly neat in mechanical appearance, and the publishers are entitled to credit for the luxury of large, clear type and good paper, well printed.

The Principles and Practice of Surgery. Being a Treatise on Surgical Diseases and Injuries. By D. Hayes Agnew, M.D., LL.D., Professor of Surgery in the Medical Department of the University of Pennsylvania. Vol. I. Philadelphia: J. B. Lippincott & Co., 1878. Royal 8vo, pp. x, 1062.

We do not propose to offer our readers an analysis of the volume before us, nor to indulge in any extended comment upon it. It is the record of the opinions and practice of its distinguished author, who for a quarter of a century has been occupied with the study of anatomy and surgery, and for nearly the same period of time engaged in teaching these important branches of medicine.

The author's views are clearly and forcibly enunciated, giving evidence of careful observation, of long experience, of painstaking research, of original investigation, and of a conscientious effort to furnish a reliable guide to the surgical practitioner.

A feature everywhere apparent throughout the volume is the practical character of the instruction, and the thoroughness—we may say minuteness—with which every detail of the various operations is described. A comprehensive view is taken of the subject in hand; the latest facts known are brought to bear upon it; the different forms of the disorder under consideration are exemplified by the introduction of pertinent cases; the views and treatment of others are presented with clearness and conciseness, and the conclusions and practice of the author are carefully compared or contrasted therewith in order that the student and practitioner may draw their own conclusions as to their relative merits. It seems as near being an exhaustive treatise upon the numerous topics discussed as is possible within the limits of a single volume.

As a guide to the diagnosis and treatment of surgical affections, this book will take first rank, if, indeed, it does not become the American Surgery. Certainly the work will be received with great favor by American physicians and surgeons, not only because of its intrinsic merits, but because of the profound respect and affection with which its eminent author is regarded by the thousands who have been privileged to listen to his oral teachings.

The book is handsomely printed, well illustrated, and is in every respect highly creditable to the publishers.

THE PHYSICIAN'S VISITING LIST FOR 1879. Philadelphia: Lindsay & Blakiston.

This convenient Visiting List is again offered to the medical profession, the present edition being its twenty-eighth annual appearance. This fact shows that it meets the needs of those for whom it is prepared.

OBITUARY.

PHILIP H. AUSTEN, M.D.

DIED, at Baltimore, Md., October 28th, 1878, from the result of a burn, Dr. PHILIP H. AUSTEN, aged fifty-six years.

Dr. Austen was born in Baltimore in 1822; graduated at Yale in his twentieth year, and two years subsequently took the degree in Medicine at the University of Maryland. He practiced general medicine in Baltimore for ten years, giving special attention to diseases of the mouth. He was elected to a professorship in the Baltimore College of Dental Surgery, which position he held for a quarter of a century. For a number of years he practiced dentistry in Baltimore.

For several years Dr. Austen was engaged in engineering, having been appointed to the charge of the Preston County (West Virginia) Coal and Iron Mines, which, in compliment to his engineering skill, were called after his name. He was an active member of the Maryland Academy of Sciences; was fond of scientific pursuits, and interested in all scientific topics. He was a French, Latin, Hebrew, and Greek scholar, and well versed in general literature and belles-lettres. He translated several French works, and edited Dr. Harris's "Principles and Practice of Dental Surgery."

Dr. Austen was an amiable, courteous gentleman, a generous, self-sacrificing friend, and a conscientious, honorable man. He leaves a wife and three daughters.

PUBLISHER'S NOTICE.

CLOSE OF THE VOLUME.

This number completes the twentieth volume of the Dental Cosmos.

The first number of the twenty-first volume will be issued January 1st, 1879, and succeeding numbers on the first of each month following.

From a small beginning, the circulation of the Dental Cosmos has steadily increased year after year, until the average monthly issue of the present volume has exceeded 6000 copies. Its subscription-list has increased even more notably in foreign countries than in our own. We are glad, also, to recognize among its subscribers and readers many practicing physicians, who find it to their advantage to avail themselves of the practical information which its pages contain.

It must be recognized that subscribers are interested in the extent of our circulation as well as the publisher. A larger list of readers among the thinkers and workers of the profession insures a greater number and variety of contributions; and a larger exchange of thought and experience, by quickening the spirit of research, and stimulating study among a broader field of laborers.

As to the future, while the general character of the journal will remain the same, we can only promise that all that a large experience and a good outlook will enable us to do shall be done to make the Dental Cosmos of greater value than ever before.

The coming volume will be under the editorial supervision of Dr. J. W. White.

We ask that renewals and new subscriptions be sent in promptly, in order that we may, with greater certainty, determine the size of the edition required.

SAMUEL S. WHITE.

PERISCOPE.

DENTAL CARIES: ETIOLOGY, PROGRESS, DIAGNOSIS, TREATMENT.—The majority of the questions raised in the foregoing work may be summed in the following propositions:

I. Dental caries is a purely chemical alteration of the enamel and ivory of the teeth.

II. It always progresses from the outside of the organ inwards; there exists no example fairly proved of *internal caries.*

III. Dental caries is *one.* The varieties of form and color depend upon simple secondary variations in the nature of the altering cause, the progress and the duration of the malady.

IV. The anatomic lesions peculiar to caries succeed one another in three regular periods of the malady: lesions of the enamel, of the ivory, of the cavity of the pulp.

V. Lesions of the enamel consist, after the removal of the cuticle, in a purely passive chemical disorganization of the prisms composing its tissue.

VI. Lesions of the ivory, consisting likewise in a chemical decomposition of its elements, may sometimes, though rarely, remain passive, but most frequently they determine in the tissue phenomena of reaction that manifest themselves by the appearance of a cone or white zone, formed by a mass of canalicules obliterated in consequence of a formation of secondary dentine.

VII. This formation of the *cone of resistance* may be followed by that of minute masses or bonelets of secondary dentine, occupying either a part or the whole of the central cavity of the tooth, and causing a proportionate retreat of the pulp.

VIII. The invasion of the central cavity by caries produces in the pulp a series of inflammatory symptoms ending in the destruction of the organ, so that the crown, henceforward without power of resisting the alteration, is rapidly softened and destroyed.

IX. As to the further alteration of the roots the caries is absolutely passive, and excites no other morbid symptoms than those that are peculiar to the dental periosteum and the neighboring parts.

X. The tooth attacked by caries does not remain passive and inert, but may in some measure undertake to resist its action by the phenomena of *condensing dentification* of the ivory.

XI. The agent of dental caries is the saliva become the medium of acid fermentations, or the vehicle of foreign substances susceptible of altering directly the tissues of the ivory and the enamel.

XII. The buccal cavity and the saliva may normally present this disposition to fermentations, and then caries occurs in the state of perfect health. This disposition may also be transmitted by heredity to the family and the race.

XIII. Most frequently the fermentescible aptitudes of the mouth depend upon local or general morbid circumstances causing modifications either in the mode of secretion or in the very composition of the salivary liquids.

XIV. The various conditions of conformation and of structure of the teeth act powerfully as predisposing causes on the development and the progress of caries. Thus, this alteration, which generally spares smooth and polished surfaces, shows itself almost exclusively either in the dental interstices, or in the holes, furrows, grooves, presented by the crown; places where chemical action may be most easily occasioned. These circumstances explain the production of caries at the same points of two corresponding teeth on opposite sides, the anatomic predisposing constitution being reproduced in the homologous and contemporaneously developed teeth.

XV. The number and gravity of caries are in inverse ratio to the resistance of the dental tissues, and in direct ratio to the activity of the fermentations of the mouth or the energy of the destructive agent.

XVI. Caries can be caused artificially by imitating the conditions of alteration that the mouth itself may present. It then offers the same characteristics as the morbid caries, with the exception of the phenomena of the organic resistance.

XVII. The intimate mechanism of the production of caries is a simple solution of the mineral and calcareous salts which enter into the constitution of the enamel and of the ivory, by the agent of new formation.

XVIII. Dental caries, or rather the anatomic predispositions to it, are transmissible by heredity, in the family and in the race, a fact that explains the caries which attacks by preference certain consanguineous groups, or certain populations.

XIX. Dental caries affects in its march a direction represented by an imaginary line extending from the point primitively altered to the center of the pulp-cavity.

XX. Nevertheless this direction is modified in some circumstances, sometimes by the nature of the altering agent, sometimes by the acts of resistance of the tooth itself.

XXI. The symptoms of caries may be divided into three successive periods:

First period, caries of the enamel: habitual indolence or slight sensations when *excited.*

Second period, middle caries: pain when *excited* ordinary and constant; *spontaneous* pain rare.

Third period, penetrating caries: spontaneous pains under the form of *crises,* together with habitual pain when *excited.*

XXII. Caries is susceptible of spontaneous cure by arrest or suspension in its progress, and the passage of the alteration to the state of *dry caries.*

XXIII. Dental caries is radically curable artificially in the immense majority of cases.

XXIV. The preventive means, prophylaxis of caries, not being able to exert any well-marked influence on the anatomy of the teeth, should have for its aim the suppression of contact with the agents of alteration, or the neutralization of their effects.

XXV. The general mode of curative treatment consists in *isolation,* preceded by the therapeutic treatment appropriate to the symptoms.

XXVI. The *therapeutics* of caries vary according to its period.

In the first period all treatment is useless, and the operation, resection or obturation, is at once possible.

In the second period, the employment of astringents and superficial caustics.

In the third period, application of profound caustics and destruction of the pulp.

XXVII. *Isolation* of caries is represented in practice by two operations:

1. Resection for some superficial cases.
2. Obturation for all of any depth.

XXVIII. The term of possibility of the cure of caries is marked by the development of grave lesions of the alveolo-dental periosteum, occasioning local disorders or general disturbances necessitating the extraction of the tooth.—*Dr. T. H. Chandler's Translation of Magitot's Treatise on Dental Caries.*

LOCAL ACTION OF VARIOUS MEDICINAL SUBSTANCES UPON THE TEETH.—Maurel (*Bull. Gén. de Thérap.*, June 30th, 1878) has made a number of experiments to ascertain exactly what effect is exerted upon healthy and partially-decayed human teeth by various solutions. His results are as follows: 1. Sulphate of copper gives a dull yellow color to the healthy enamel; it appears to attack the cementum, and gives it, as well as the dentine, a persistent green color, which appears through the enamel. 2. Chlorate of potassium is without action upon the teeth. 3. Nitrate of silver does not destroy the structure of the teeth, but it gives them a black metallic luster. 4. Crystallized alum exercises a very destructive action upon the enamel. Its action on the dentine and the cementum is not constant, and when exercised is only feeble, the cementum being less altered than the dentine. 5. Alcohol is without action on the enamel of the teeth. 6. Tincture of benzoin, while exercising no effect upon the structure of the dental tissues, does in time color the cementum and dentine brown. 7. Tincture of mint is without action on the hard tissues of the teeth. 8. Tincture of cinchona, while it has no effect on the structure of the teeth, colors the roots brown. 9. Cologne has no effect on the teeth. 10. Tobacco in solution has no effect upon the structure of the teeth, which, however, it colors a more or less dark brown. The enamel is least affected by it.—*Philadelphia Medical Times.*

HOWARD'S METHOD OF ARTIFICIAL RESPIRATION.—Dr. Benjamin Howard, U. S. A., has been attracting considerable attention in London by his demonstration of his method of artificial respiration. As some years have passed since it was first laid before the profession, we give anew the process he recommends:

In order to dispose of the accumulations in the stomach or chest, the patient, stripped to the waist, is turned face downward, and a firm bolster being placed beneath the epigastrium, makes that the highest and the mouth the lowest point. Pressure being made on the back, the object is accomplished by both ejection and drainage. The patient is quickly turned upon his back, the bolster placed beneath it, making again the epigastrium and the anterior margins of the costal cartilages the highest points of the body, the hips, shoulders, and occiput barely resting on the ground. The patient's wrists are seized, and, the utmost possible extension being secured with them crossed behind his head, they are pinned to the ground with the left hand, so as to maintain it. With the right thumb and forefinger, armed with the corner of a dry handkerchief, the tip of the tongue is withdrawn and held out of the extreme right corner of the mouth. (The wrists and tongue may be confided to any aid.) In this position two-thirds of the entrance to the mouth is free. The epiglottis, by this backward curvature of the neck, is precluded from pressure by undue flexion. The head is dependent, the free margins of the costal cartilages are as prominent as they can be made. The epigastrium being the highest point, the diaphragm is neither embarrassed from pressure above nor from below. To produce respiration the operator kneels astride the patient's hips and rests the ball of each thumb upon the corresponding costo-xiphoid ligaments, the fingers falling naturally into the lower intercostal spaces. Resting his elbows against his sides, and using his knees as a pivot, the operator throws the whole weight of his body slowly and steadily forward, until his mouth nearly touches the mouth of the patient, and while one might slowly count one, two, three; then, suddenly, by a final push, he springs back to his first position on his knees, remaining there while one might slowly count one, two; then repeat, and so on about eight or ten times a minute. The resiliency of the ribs insures an instant rebound to the point of departure. The operation can be practiced by anybody, anywhere, before or after division of the funis; in a bath, bed, or boat; and friction, electricity, insufflation, or tracheotomy could be practiced simultaneously, without inconvenience.—*Medical and Surgical Reporter.*

AMAUROSIS FOLLOWING DENTAL DISEASE.—Sirletti (*Le Mouvement Méd.*, 1878, p. 193; from *Arch. Clin. Ital. dei Med. Condotti*) reports the case of an old man attacked suddenly with hemeralopia, without any previous enfeeblement of vision. Knowing that dental troubles sometimes cause endo-ocular hyperæmia and amaurosis through the ophthalmic ganglion, S. inquired which of the patient's teeth were decayed. He found that for some time he had suffered severe pain in the upper canines, of which the crown was gone. On examination, a fistulous cavity, with intra- and extra-alveolar periostitis, was found in the root of each canine. These teeth having been extracted, the patient began to be able to distinguish light from darkness almost immediately, and by the end of six days his sight was completely restored.—*Philadelphia Medical Times.*

VERY LARGE SALIVARY CALCULUS.—Dr. Freudenberg relates the case of a gentleman who consulted him on account of a tumor under the tongue, which gave him only moderate uneasiness, and did not cause any increase of the normal saliva. It dated back six months, and had been since then continually on the increase. On inspection a salivary concretion was found to be projecting to the extent of a centimetre, and by a little manipulation the calculus was dislodged by mere pressure, springing out at last as if from an elastic ring. In length the concretion measured 3.5 centimetres, the diameter of its base measuring 1.4 centimetre. It consisted of phosphate and carbonate of lime, and an albuminous substance, the phosphate constituting an unusually large proportion. The calculus occupied the duct of the right sublingual gland.—*Berlin. Klin. Woch.*—*Medical Times and Gazette.*

NECROSIS OF THE SUPERIOR MAXILLA, FOLLOWING SMALLPOX.—A girl, six years old, contracted smallpox three months ago. A month from the onset two teeth fell out and the breath became foul. About an inch of the alveolar process necrosed, became exposed, and was taken away with the greatest ease. Such a form of necrosis may follow after exanthemata.—*Guy's Hospital Reports, in British Medical Journal.*

Amyl Nitrite and Nitrate.—(J. W. F., Topeka, Kansas.)—These two substances are *not* identical, although many practitioners and druggists often use the terms synonymously. This confusion should at once be cleared up, since both substances are used medicinally, and appear to have different therapeutic properties. The *amyl nitrite* $C_5H_{11}NO_2$ is a salt of nitrous acid, HNO_2, in which the hydrogen has been replaced by amyl C_5H_{11}; the *amyl nitrate* $C_5H_{11}NO_3$ is similarly formed by the substitution of amyl for the hydrogen of nitric acid, HNO_3. The action of nitric acid on monatomic alcohols, as methylic (wood naphtha), ethylic (common alcohol), butylic, amylic (fusel oil), produces in general a nitrite, owing to the decomposition of the nitric acid and the oxidation of a part of the alcohol. If, however, a body is present, during the reaction, which can remove or decompose the nitrous acid formed,—as, for instance, urea,—a nitrate alone is the result. *Amyl nitrate* has general anodyne properties, and is in small doses a most effective remedy for general nervous excitability. *Amyl nitrite*, however, which has been used for a much longer period, acts by causing paralysis and relaxation of involuntary muscle fibers, and for this reason has become extensively employed in asthma, syncope, and similar affections.—*Notes, Queries, and Answers, in New Remedies.*

Dental Operation upon a Monkey.—One of the large monkeys at the Alexandra Palace had been for some time suffering from the decay of the right lower canine, and an abscess, forming a large protuberance on the jaw, had resulted. The pain seemed so great it was decided to consult a dentist as to what should be done, and, as the poor creature was at times very savage, it was thought that, if the tooth had to be extracted, the gas should be used for the safety of the operator. Preparations were made accordingly, but the behavior of the monkey was quite a surprise to all who were concerned. He showed great fight on being taken out of his cage, and not only struggled against being put into a sack prepared, with a hole cut for his head, but forced one of his hands out, and mopped and screamed, and gave promise of being very troublesome. Directly, however, Mr. Lewin Mosely, who had undertaken the operation, managed to get his hand on the abscess and gave relief, the monkey's demeanor changed entirely. He laid his head down quietly for examination, and, without the use of the gas, submitted to the removal of a stump and a tooth as quietly as possible.—*Nature.*

Progress of Dentistry in Italy.—"The Odontalgic Congress ended its sitting yesterday in a very pleasant manner, several foreigners being present. To-morrow we shall give a detailed account of it.

"Last evening the members belonging to Genoa gave a banquet to their national and foreign colleagues; cordiality reigned, and the festivity was rendered still more splendid by the presence of the renowned dentists Telschow, of the Imperial Court of Berlin, with his beautiful wife; of Dr. George Bock, of Nuremburg, and of Mr. Finigan, of London.

"The toasts made by these foreign gentlemen in answer to the orations addressed to them by the invited guests set forth their highly honorable conception of the Italian dental art; that is to say, they have observed the degree of progress in the art in our Italy, and with surprise have been obliged to notice that in the perfection of the mechanical operations, it was proceeding already at an equal pace with America and with England."—*Translated from Commercio di Genova.*

ROYAL COLLEGE OF SURGEONS IN IRELAND—INSTITUTION OF A DENTAL DIPLOMA.—In pursuance of powers conferred by the "Dentists' Act" of 1878, the Royal College of Surgeons in Ireland has already appointed a court of examiners, and inaugurated examinations in dental surgery for existing practitioners resident in Great Britain and Ireland, who are eligible according to certain conditions.

The first of these examinations took place on September 7th, 9th, 10th, when upwards of fifty gentlemen presented themselves, and, with one or two exceptions, satisfied the examiners as to their fitness to hold the diploma of the college. Among the successful candidates, the names of four gentlemen who hold the American degree of D.D.S. are to be found, viz., F. Dalley, Wolverhampton; J. Redman, Brighton; W. H. Waite, Liverpool; and D. A. Wormald, Bury.

The dental profession in Great Britain is to be congratulated on having at length obtained a recognized legal status by means of the "Dentists' Act," and also upon having secured from so high a medical authority as the Royal College of Surgeons in Ireland an examination in dental surgery, which is open to gentlemen in established and reputable practice upon "reasonable" and "accessible terms." The title of the new diploma is "*Licentiate in Dental Surgery of the Royal College of Surgeons in Ireland.*"

GLUE FOR POLISHED STEEL.—The Turks glue diamonds and other jewels to their metal settings with a mixture made as follows: Dissolve five or six bits of gum mastic, each the size of a large pea, in as much spirits of wine as will suffice to render it liquid. In another vessel dissolve in brandy as much isinglass, previously softened in water, as will make a two-ounce phial of strong glue, adding two small bits of gum ammoniac, which must be rubbed until dissolved. Then mix the whole with heat. Keep in a phial closely stopped. When it is to be used set the phial in boiling water. This cement perfectly resists moisture, and it is said to be able to unite effectively two surfaces of polished steel.—*Scientific American.*

HINTS AND QUERIES.

"He that questioneth much shall learn much."—BACON.

CORRESPONDENTS desiring a reply in this department are requested to make use of *distinctive signatures or initials*, and avoid the practice of signing their communications Reader, Subscriber, etc.

CORRESPONDENTS who wish notice to be taken of their communications should authenticate them with their names. We cannot insert queries or replies except they are so accompanied. Names not necessarily for publication.

WHAT are the best remedies to retard the wasting of the alveolar process, arising from whatever cause?—H. A. E.

On the 30th of May a patient, unmarried, eighteen years of age, of nervo-sanguine temperament, and in good health, presented for the treatment of caries of the right superior sixth-year molar, extending from the fissures well down below the margin of the gum on the mesial surface. The adjoining bicuspid had been filled with gold on the distal surface, satisfactorily and comfortably (though sensitive when first filled), one year ago. I adjusted the rubber dam, and excavated the cavity thoroughly. The dentine was exceedingly sensitive, though the decay was not deep. I filled with gold, and dismissed the patient. She returned, complaining that thermal changes caused most severe pain, which never entirely abated, and often became intense, especially during the night. Finally, concluding that forbearance had ceased to be a virtue, she resolved upon having the tooth extracted. I would not consent; but, thinking that some imperfection of the filling might be the cause, I removed it and replaced it with gutta-percha. Up to this time the patient is not relieved. There is no inflammation of the gums nor of the periosteum. The tooth had not given any trouble previous to filling. Will some one give me an explanation?—E. J. Perry.

In the answers given to W. R. H. in "Hints and Queries" for the prevention of dark joints between sectional teeth, I have not seen the plan which I resort to. In grinding up I make the space slightly V-shaped, and after separating the flask, I pack between the joints "dead" plaster of the consistency of putty. It is well known that dead plaster *will not shrink.* Oxychloride of zinc and all other similar plastics *will* shrink, and the rubber is liable to be forced between it and the sections. I have not had a failure since adopting the above plan.—J. R. Cressinger, *Sunbury, Pennsylvania.*

Reply to W. R. H., who inquires how to prevent dark joints between blocks of teeth. Other correspondents have advised him to use various preparations to plaster them up with, and to allow plenty of room for escape of surplus rubber, etc. Now, I don't think it makes any difference what the joints are filled with. I make a moderately good joint and fill between with plaster, *being sure not to allow a particle of wax to touch the joint* while grinding up, or when placing the gutta-percha plate and wax preparatory to putting in the flask. Then I never use any dry heat about packing. It is a great deal better to have the flask and rubber perfectly cold than to use dry heat. I have my flask cold, place my rubber on the cover to a tin dish containing boiling water, and then pack it in, being sure to get in enough. It doesn't make much difference how much. I have sometimes got in twice as much as I needed, but never have a dark or gaping joint. To get my flask together, I place it in boiling water a few minutes and screw down.—R. C. S.

E. F. Z., a boy about seven and a half years of age, was brought to me about a month ago. An itinerant dentist had endeavored to extract the right deciduous central incisor, but instead of doing so, forced it up so that half of the tooth protruded into the nasal cavity. The child fainted, and nothing further was done at the time. A few days after he was brought to me. His face was very much swollen. He had spasms every few hours. I extracted the tooth through the right nostril. A copious discharge of pus followed. The swelling subsided rapidly, and in three days the child was playing around as usual.—J. R. Cressinger, *Sunbury, Pennsylvauia.*